Course Review Committee 2021-22

(Department of Computer Applications)

Feedback Analysis Report for Curriculum 2021-22

Department Of Computer Applications

Invertis University, Bareilly, U.P., India

Order: Departmental Course Review Committee

Dated: 10-02-2021

In order to maintain the quality and best outcome of the program the following Course review committee has been constituted for the departmental academic program review for session 2021-22.

Course Review Committee (CRC-Committee)

This Committee has been framed in the department with three faculty members:

a. **Mr. Amit Taneja (Committee Head)**

b. **Ms. Shivangi Ghildiyal (Member)**

c. **Ms. Archana Saxena (Member)**

Program Review Committee (PRC-Committee)

This Committee has been framed in the department with three faculty members:

1. **Mr. Jitendra Kumar Chaudhary**
2. **Mr. Saurabh Kumar**
3. **Mr. Kushal Johari**

Mr. Jitendra Kumar Chaudhary

Head, Department of Computer Applications

Letter (CRC Work Status)

Dated: 14-02-2021

The Course review committee (CRC) 2021 of Computer Applications department successfully analyzed the complete data of feedbacks of all five stakeholders. All the data is compiled in presence of CRC members. Report is ready for transfer to PRC (Program review committee) of the Computer Applications department.

Ms. Shivangi Ghildiyal (Member) **Ms. Archana Saxena (Member)**

Mr. Amit Taneja

(Committee Head)

I. Analysis of Faculty Feedback

Analysis report of Feedback Forms on Design and Review of Syllabus (2021-22)

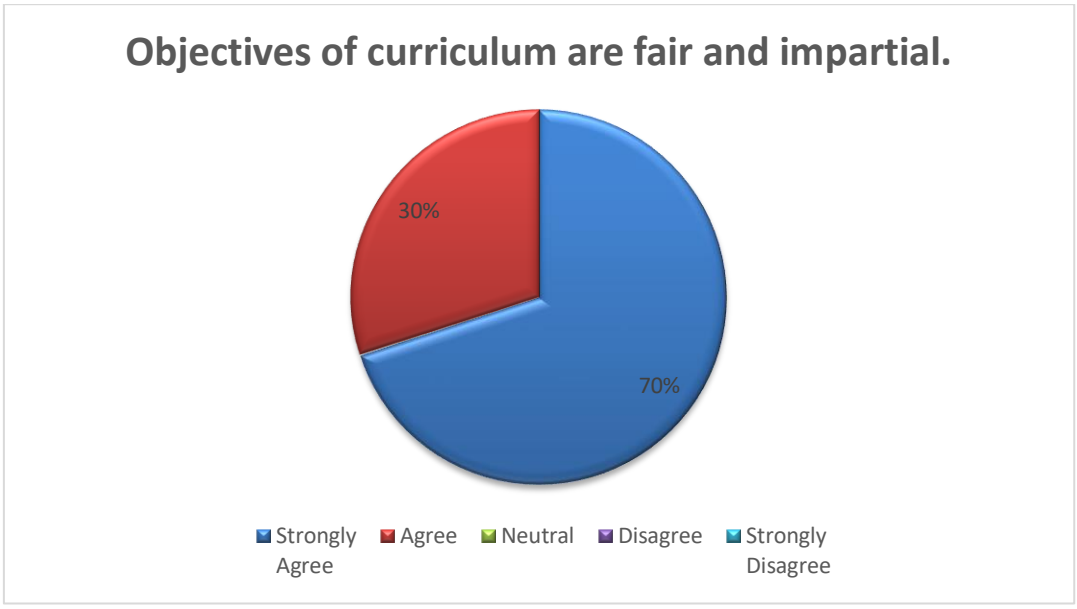
Feedback was prepared with the help of questionnaires. feedback forms were collected from teachers. Response expected from them on curriculum was recorded on following 5-point scale.

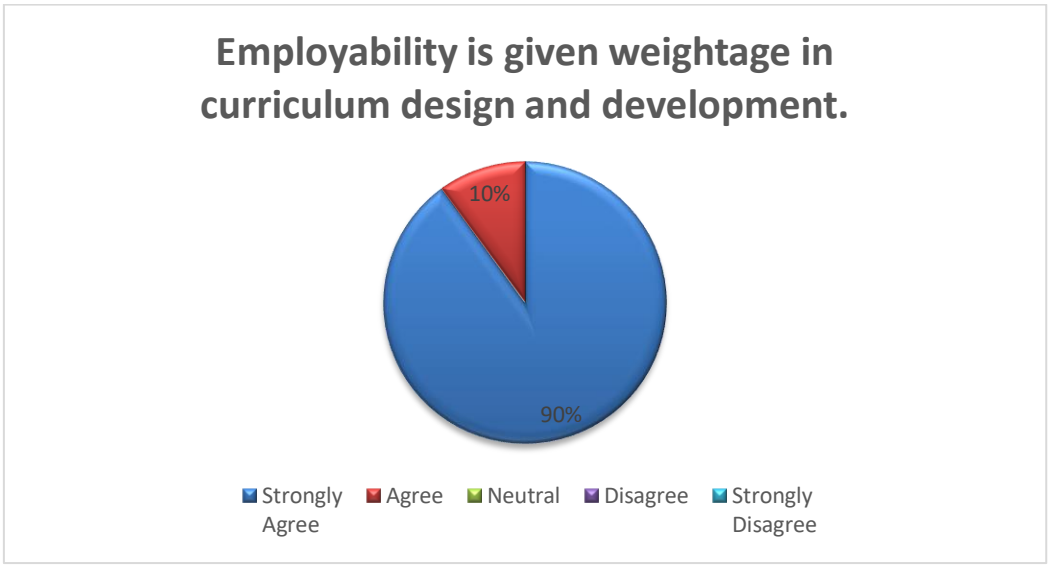
Teacher Feedback Analysis on Design and Review of Syllabus

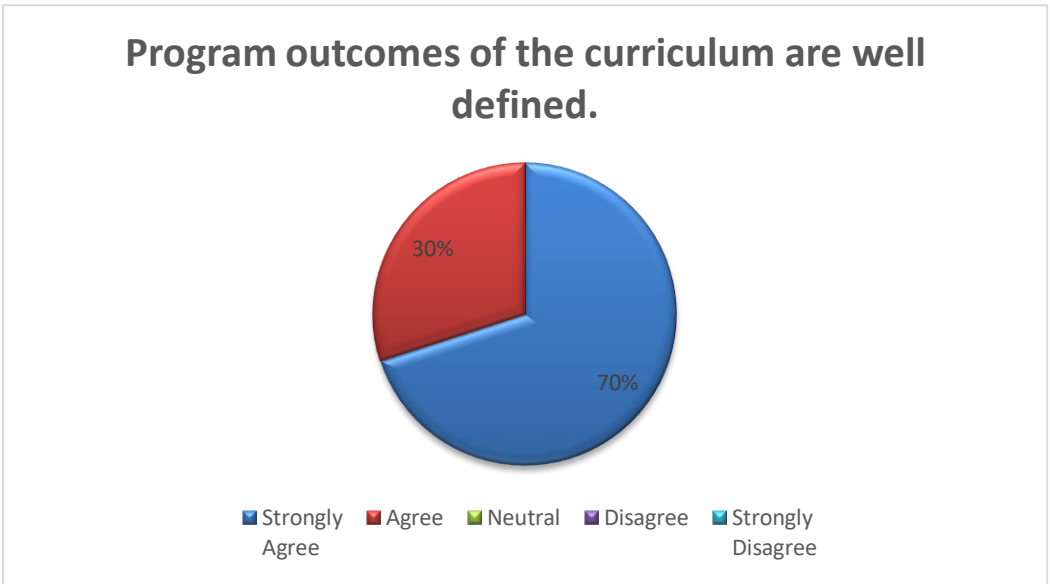
Total Responses collected

Sr. No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Objectives of curriculum are fair and impartial.	7	3	0	0	0
2	Employability is given weightage in curriculum design and development.	9	1	0	0	0
3	Program outcomes of the curriculum are well defined.	7	3	0	0	0
4	Curriculum has been updated from time to time.	9	1	0	0	0
5	Curriculum having good academic flexibility.	6	4	0	0	0
6	Curriculum helps in improving personality development of students.	6	4	0	0	0
Total =		44	16	0	0	0

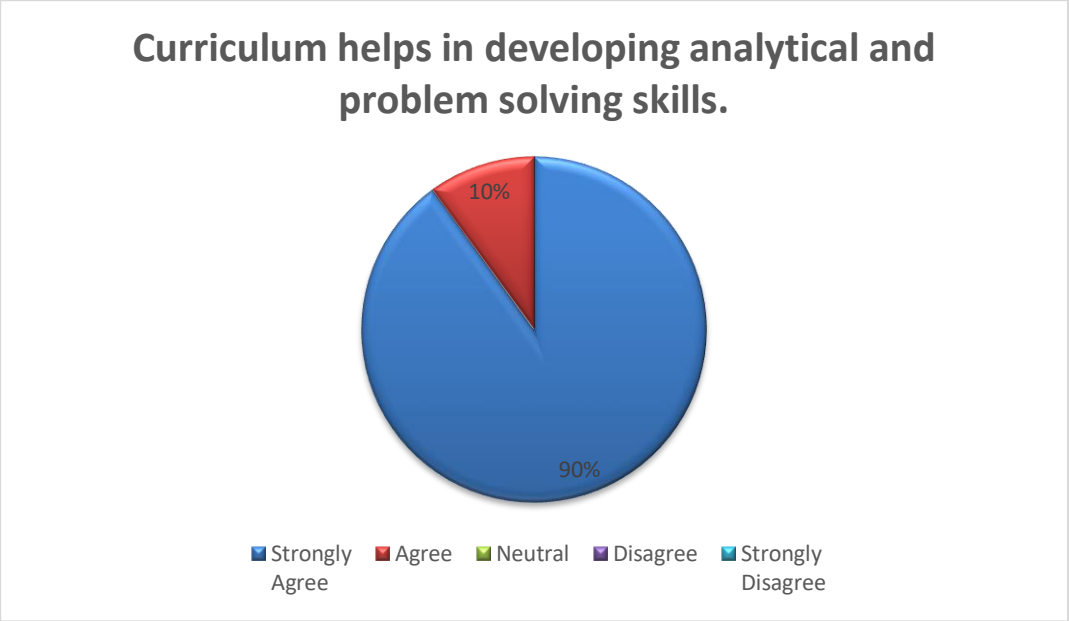
PIE-CHARTS (FACULTY RESPONSES)

1. 
Objectives of curriculum are fair and impartial.
30%
70%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

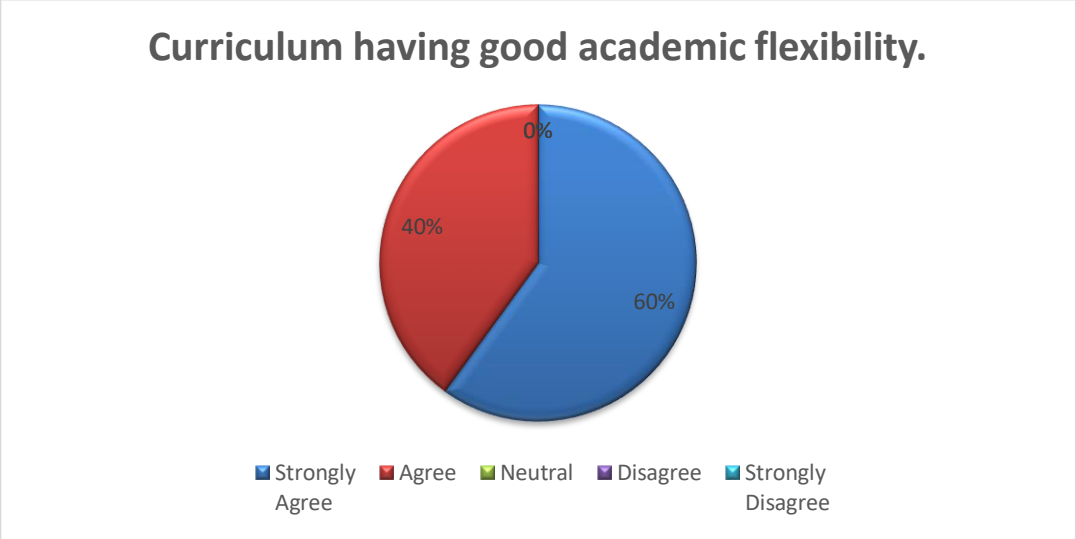
2. 
Employability is given weightage in curriculum design and development.
10%
90%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

3. 
Program outcomes of the curriculum are well defined.
30%
70%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

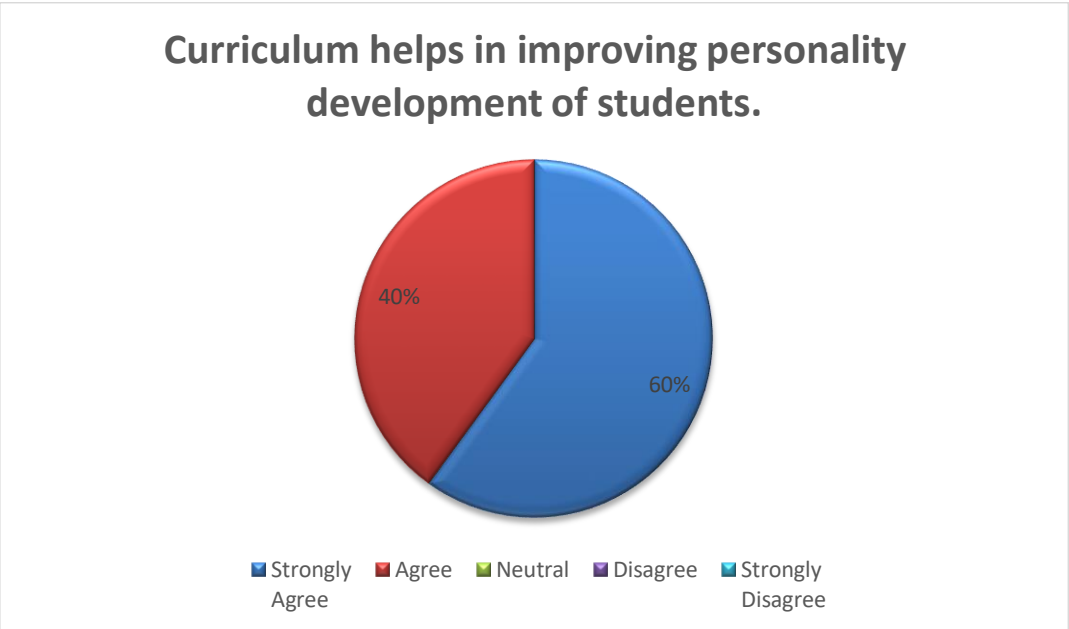
4.

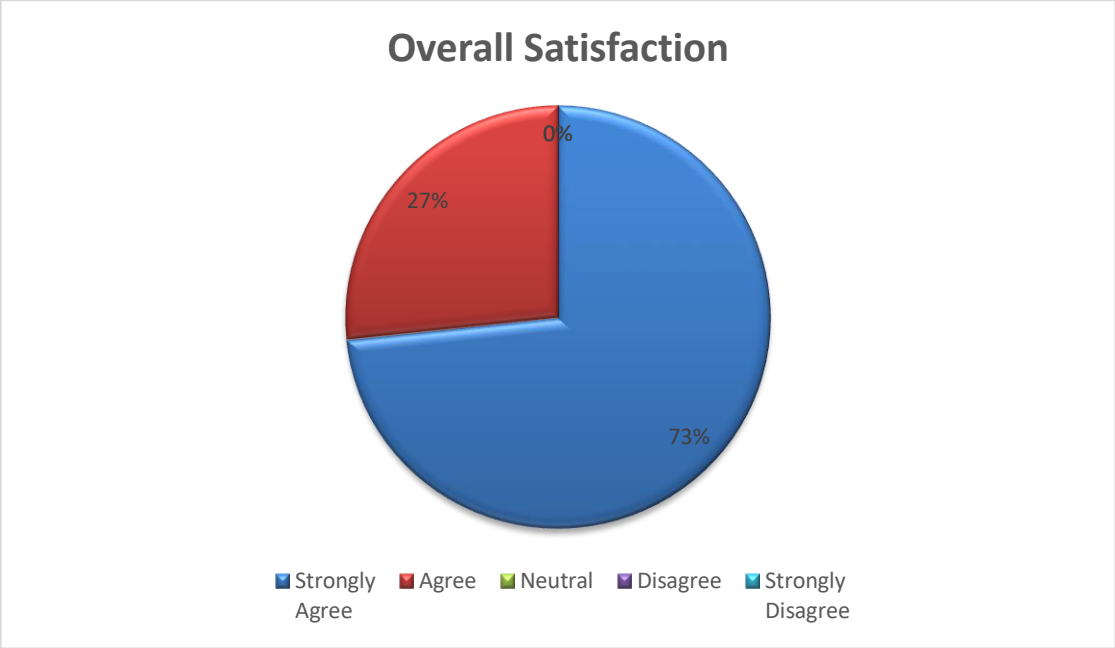

Curriculum helps in developing analytical and problem solving skills.
10%
90%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

5.


Curriculum having good academic flexibility.
0%
40%
60%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

6.


Curriculum helps in improving personality development of students.
40%
60%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

7. 

OBSERVATIONS

1. Majority of the faculties feel that the curriculum design is fair and impartial.
2. Nearly all have an opinion that the curriculum is designed giving attention to development of employability skills.
3. There is still a margin to refine the course outcomes.
4. As per the results, the curriculum at present helps in developing analytical and problem-solving skills.
5. The course curriculum is providing enough flexibility for students to pursue interdisciplinary courses, providing electives in all main areas of research
6. Curriculum is taking care of student's personality development.

II. Analysis of Alumni's Feedback

Analysis report of Feedback Forms on Design and Review of Syllabus (2021-22)

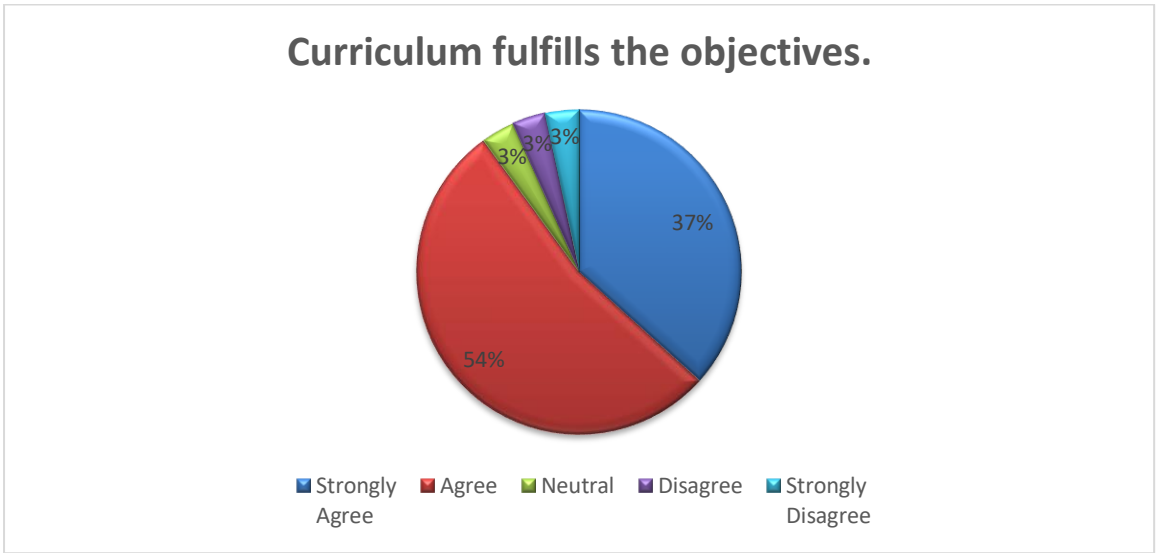
Feedback was prepared with the help of questionnaires. Feedback forms were collected from alumni. Response expected from them on curriculum was record by using 5-point scale.

Alumni Feedback Analysis on Design and Review of Syllabus
Total Form collected-

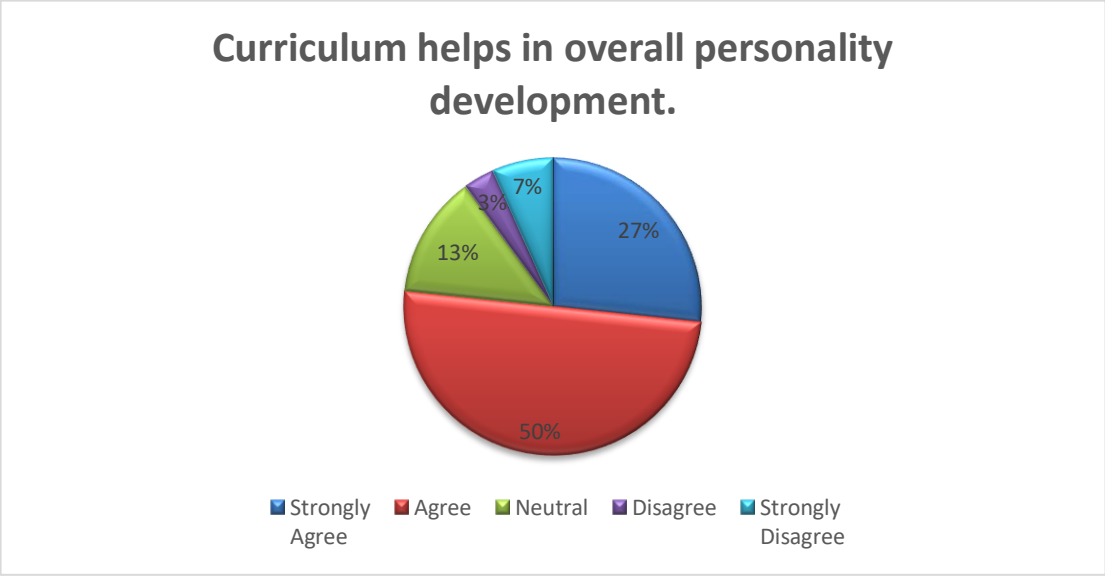
Sr. No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Curriculum fulfills the objectives of the course.	11	16	1	1	1
2	Curriculum helps in overall personality development.	8	15	4	1	2
3	Curriculum enhances employability.	7	15	4	2	2
4	Skill based content in Curriculum.	8	13	4	3	1
5	Curriculum is effective in constructive learning.	7	15	6	0	2
6	Curriculum is effective in developing analytical and problem-solving skills.	8	13	5	2	2
Total =		49	87	24	9	10

PIE-CHARTS (ALUMNI RESPONSES)

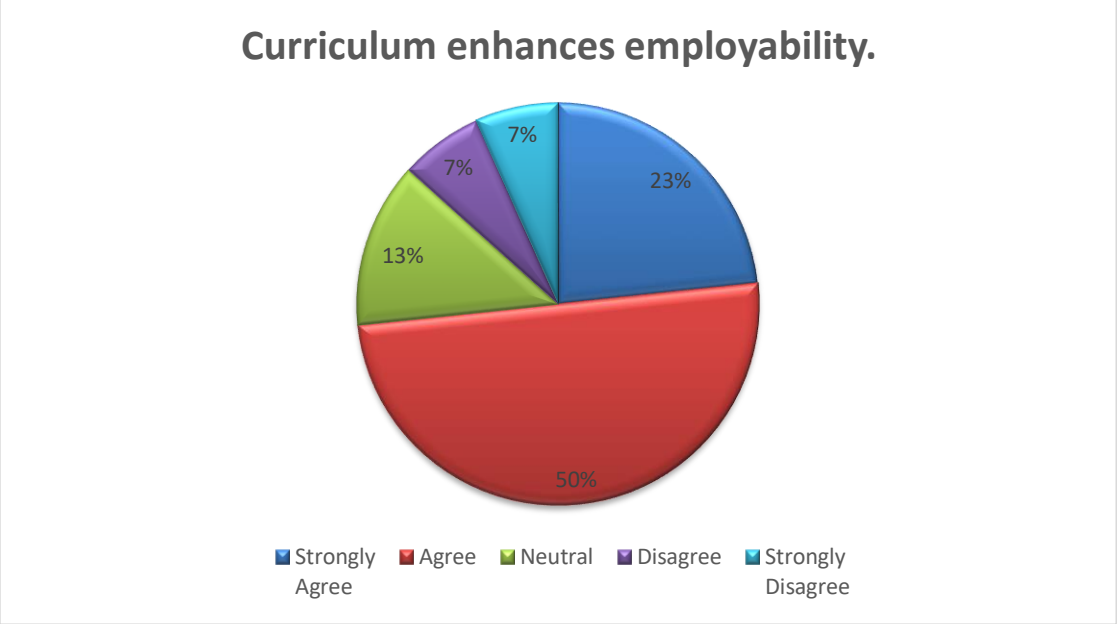
1.



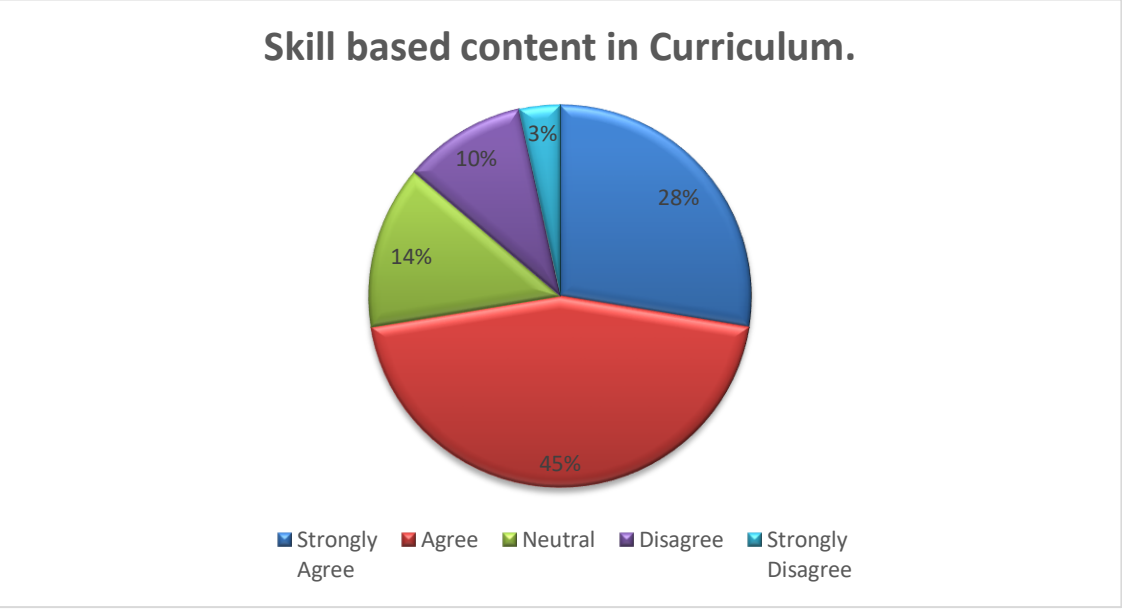
2.


Curriculum helps in overall personality development.
27%
50%
13%
3%
7%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

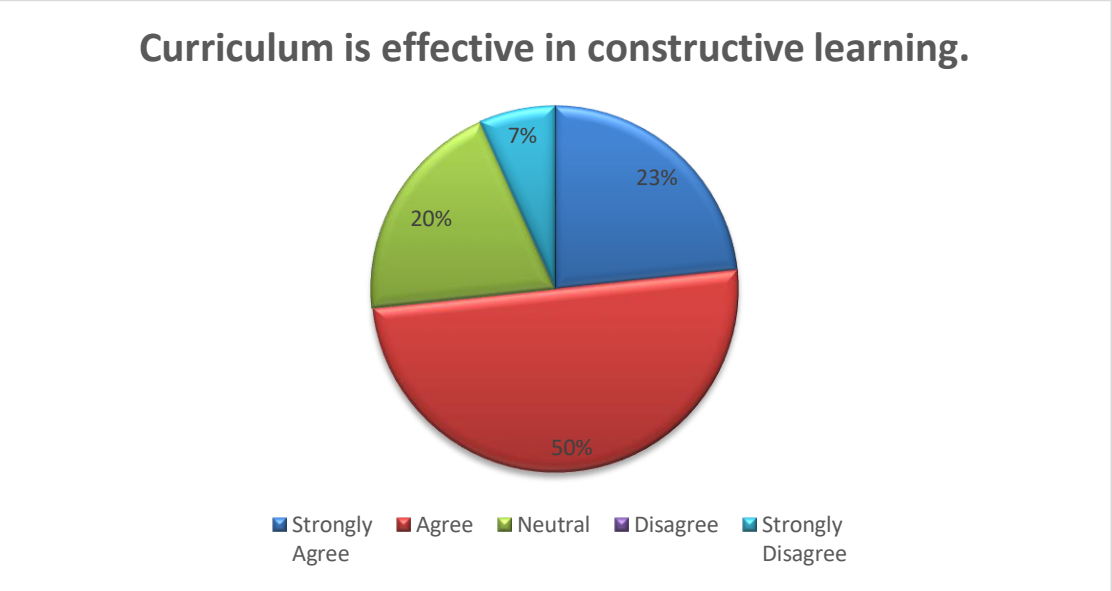
3.


Curriculum enhances employability.
23%
50%
13%
7%
7%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

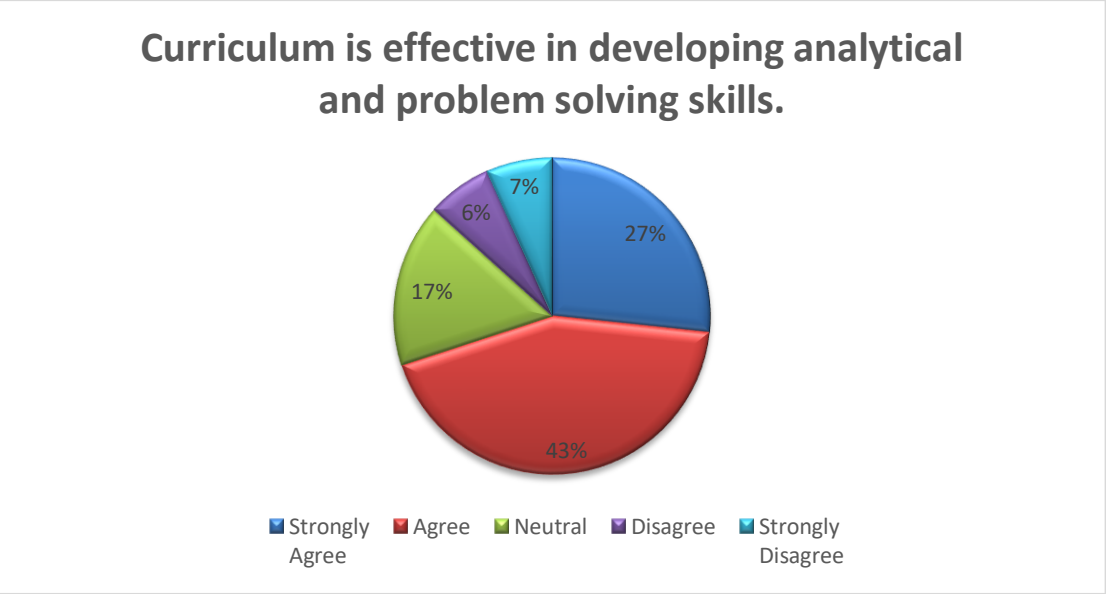
4.


Skill based content in Curriculum.
28%
45%
14%
10%
3%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

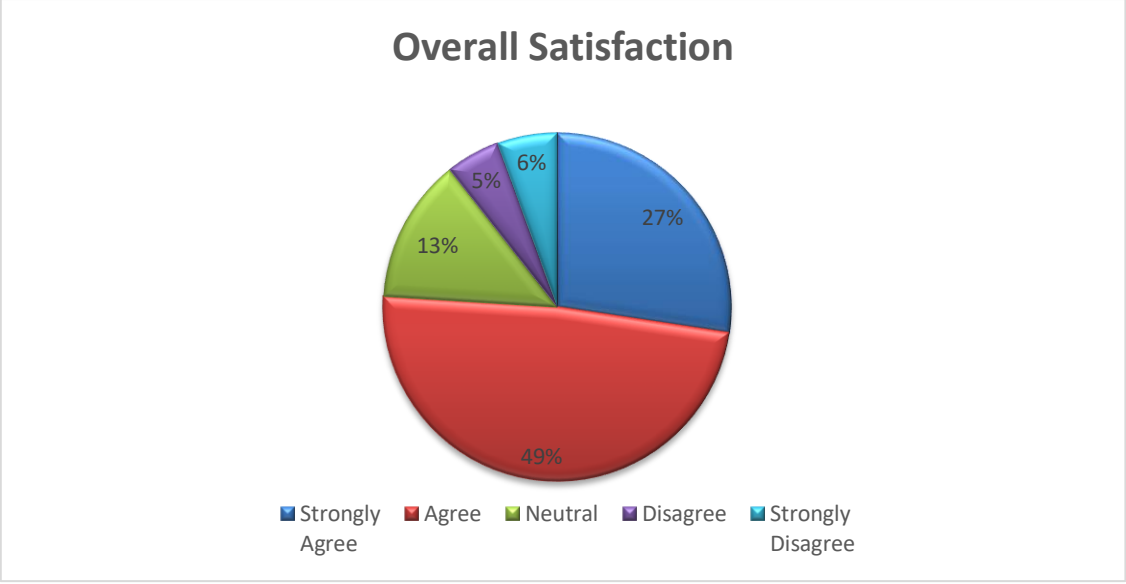
5.


Curriculum is effective in constructive learning.
7%
23%
20%
50%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

6.


Curriculum is effective in developing analytical and problem solving skills.
7%
6%
27%
17%
43%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

7.


Overall Satisfaction
6%
5%
27%
13%
49%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

OBSERVATIONS

1. Curriculum needs to be updated with respect to skill-based courses.
2. Curriculum needs to be revised by looking into how much constructive learning is given importance to as part of the courses taught.
3. Problem-solving skills are to be enhanced through the subjects as part of course.

III. Analysis of Employer's Feedback

Analysis report of Feedback Forms on Design and Review of Syllabus (2021-22)

Feedback was prepared with the help of questionnaires. Feedback forms were collected from teachers, students, parents, employees and alumni. Response expected from them on curriculum was record by using 5-point scale.

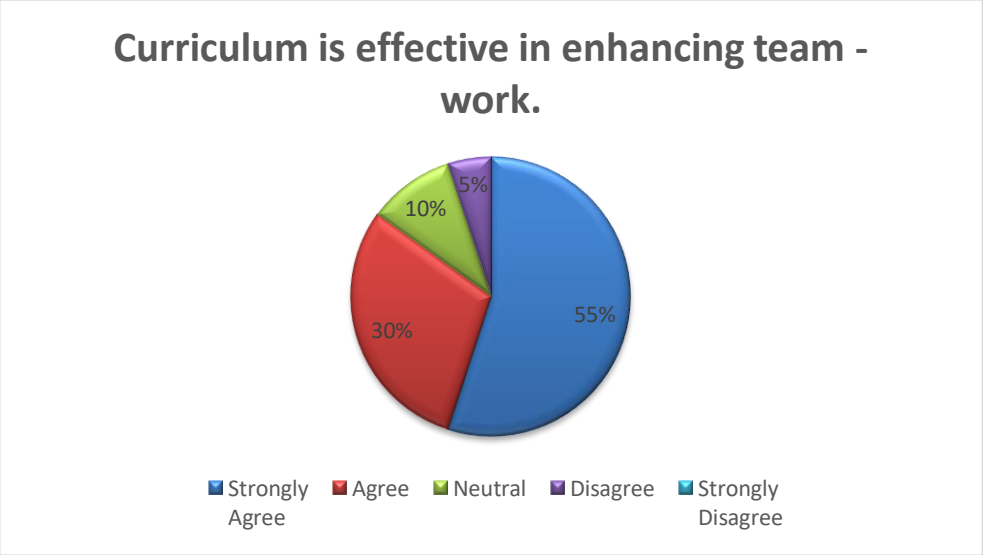
Employer Feedback Analysis on Design and Review of Syllabus

Total Form collected-

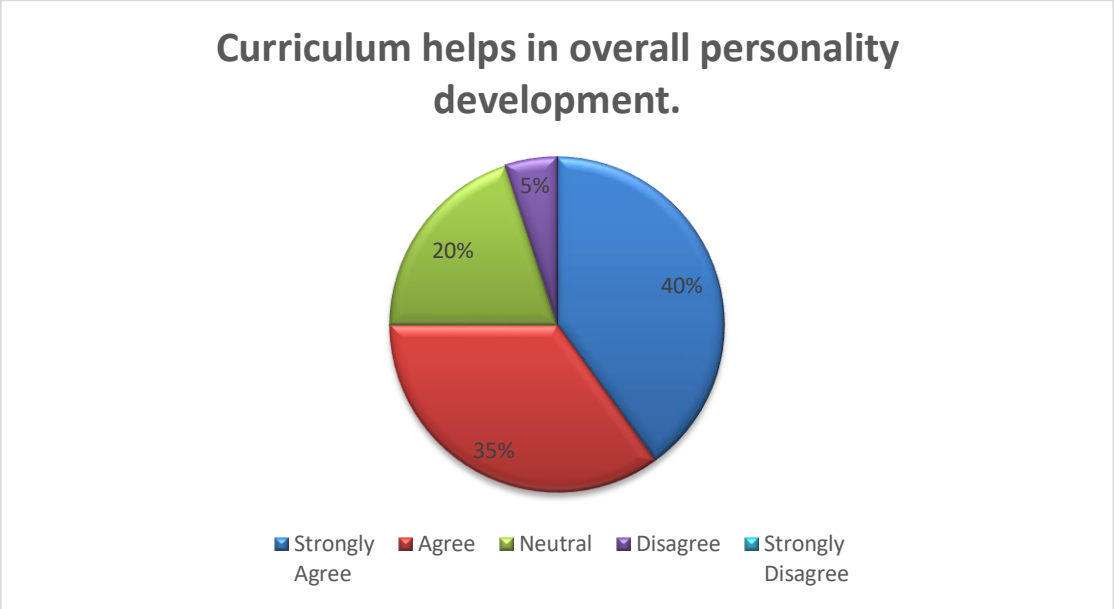
Sr. No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Curriculum is effective in enhancing team - work.	11	6	2	1	0
2	Curriculum helps in overall personality development.	8	7	4	1	0
3	Curriculum enhances employability.	6	9	3	2	0
4	Skill based content in curriculum.	8	7	3	1	1
5	Curriculum is effective in developing ICT & communication skills.	6	7	4	3	0
6	Curriculum has relevance to real life situations, reflects current trends and practices in the respective disciplines.	6	8	3	2	1
Total =		45	44	19	10	2

PIE-CHARTS (EMPLOYER RESPONSES)

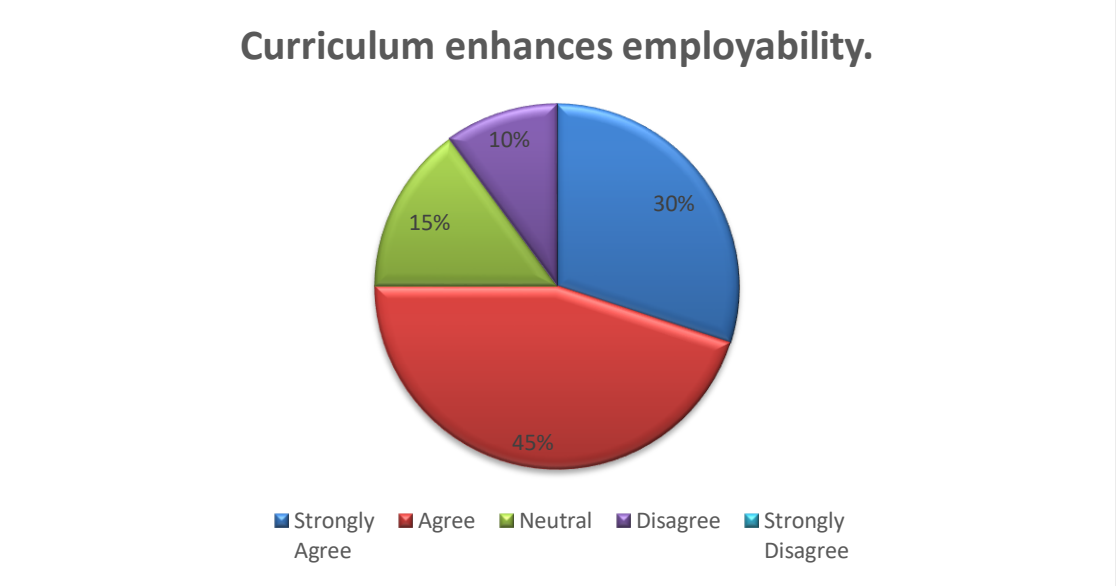
1.



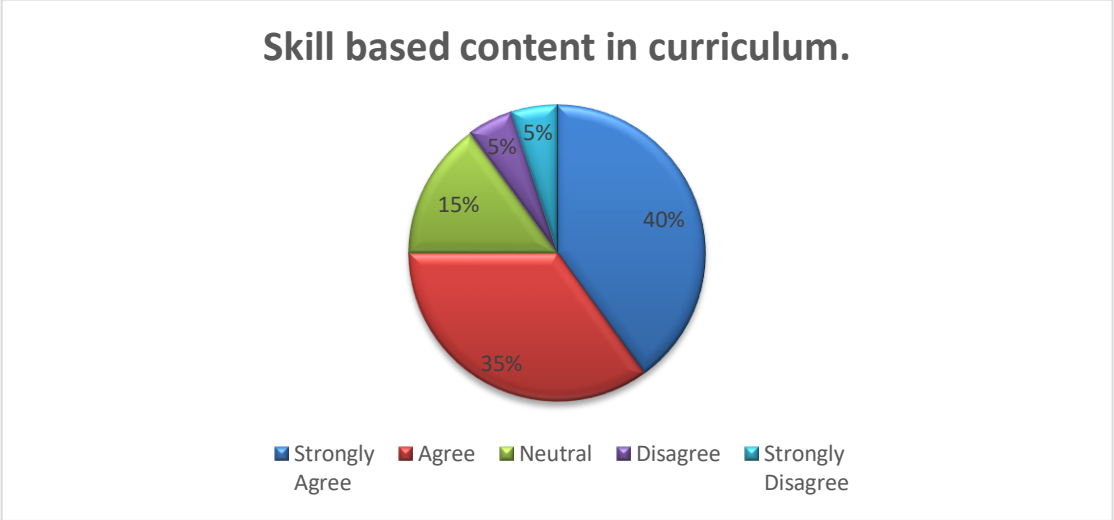
2.


Curriculum helps in overall personality development.
5%
20%
40%
35%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

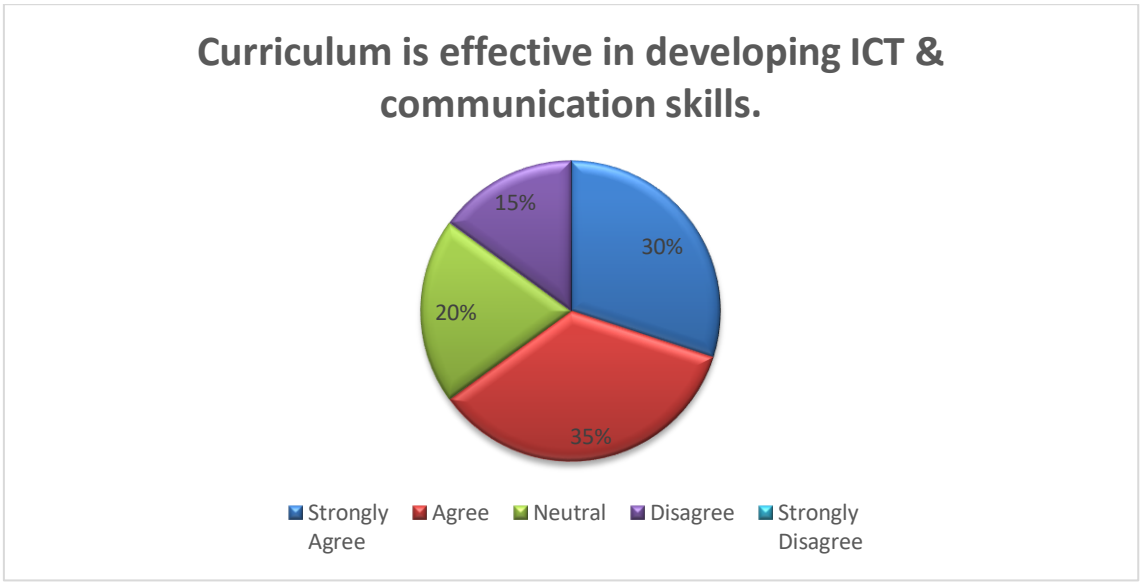
3.


Curriculum enhances employability.
10%
30%
15%
45%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

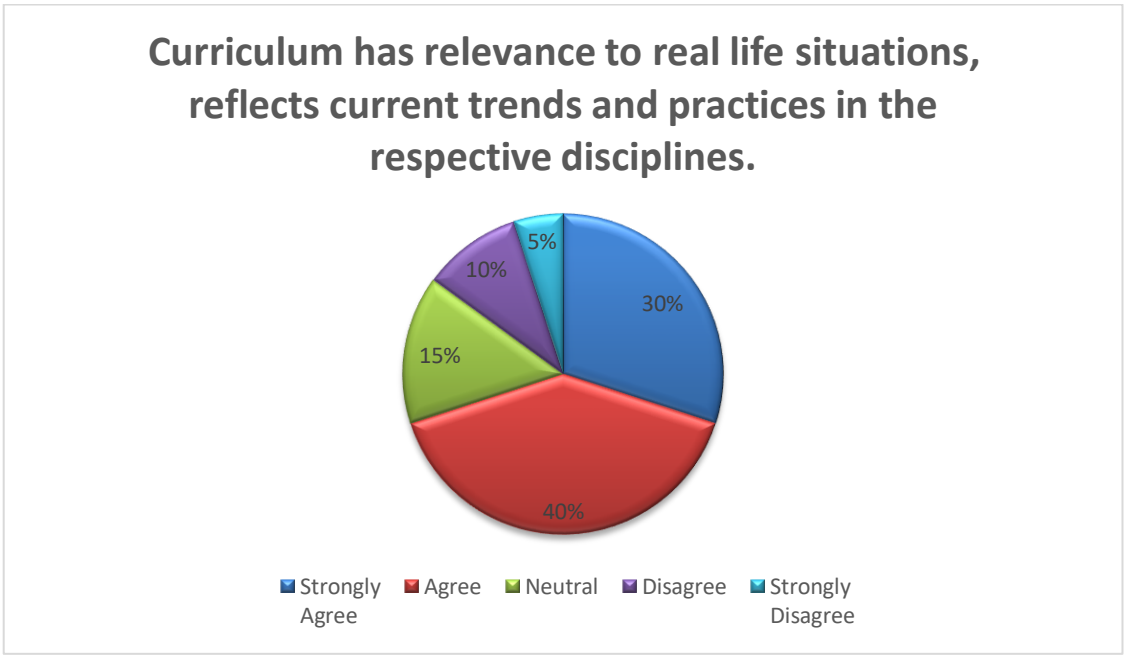
4.


Skill based content in curriculum.
5%
5%
40%
15%
35%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

5.


Curriculum is effective in developing ICT & communication skills.
15%
30%
20%
35%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

6.


Curriculum has relevance to real life situations, reflects current trends and practices in the respective disciplines.
5%
10%
30%
15%
40%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

7.

OBSERVATIONS

1. We need to include more real-time case-studies as part of the course syllabus.
2. The curriculum needs to consider development of Communication skills and ICT skills through its syllabus.

Program Review Committee (PRC) Report AY 21-22

Date: 1/02/2021

Committee Members of PRC:

1. Mr. Jitendra Kumar Chaudhary
2. Mr. Saurabh Kumar
3. Mr. Kushal Johari

Observations:

Based on the report received by CRC, the following points are noted:

1. Curriculum needs to be updated to include courses that upskill a student.
2. To introduce new programs (BCA (Cloud) and (AI)) which will provide an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses for BCA programs.

Recommendations:

1. To introduce new skill based courses for BCA Cloud and BCA AI students.
2. To create a list of exposure and flexibility during the course curriculum.
3. The following schemes are suggested with respect to above mentioned points to inculcate for BCA AI (Annexure-I) and BCA Cloud (Annexure-II).

ANNEXURE-I (BCA (AI) scheme)

BCA [AI]

First Semester

S.No.	CODE	SUBJECT NAME	STATUS	REMARKS
1	BCAI101	English-I	New	Credit point of BCA101 is 3
2	BCAI102	Theory of Mathematics	New	Credit point of BCA102 is 3
3	BCAI103	Computer Architecture & Organization	New	Credit point of BCA103 is 3
4	BCAI104	Programming in C	New	Credit point of BCA104 is 3
5	BCAI105	Client Side scripting	New	Credit point of BCAI105 is 3

6	BCAI106	Office Automation Lab	New	Credit point of BCAI106 is 2 I
7	BCAI107	Programming in C Lab	New	Credit point of BCAI107 is 1
8	BCAI108	Client Side scripting Lab	New	Credit point of BCAI108 is 2
9	BCAI109	Effective Communication Skills	New	Credit point of BCAI109 is 2

Second Semester:

S.No.	CODE	SUBJECT NAME	STATUS	REMARKS
1	BCAI201	ENGLISH-II	New	Credit point of BCAI201 is 3
2	BCAI202	Linux Shell Scripting	New	Credit point of BCAI202 is 3
3	BCAI203	Object Oriented Programming Using Java	New	Credit point of BCAI203 is 2
4	BCAI204	Operating Systems	New	Credit point of BCAI204 is 3
5	BCAI205	Data Structures using C	New	Credit point of BCAI205 is 3
6	BCAI206	Environmental Studies	New	Credit point of BCAI206 is 3
7	BCAI207	Data Structures using C Lab	New	Credit point of BCAI207 is 2
8	BCAI208	Linux Shell Scripting Lab	New	Credit point of BCAI208 is 1
9	BCAI209	Object Oriented Programming Using Java Lab	New	Credit point of BCAI209 is 2
10	BCAI210	Personality Development	New	Credit point of BCAI210 is 2

Third Semester:

S. No	CODE	SUBJECT NAME	STATUS	REMARKS
1	BCAI301	DBMS	New	Credit point of BCAI301 is 3
2	BCAI302	Computer Networks	New	Credit point of BCAI302 is 3
3	BCAI401	Python Programming	N ew	Credit point of BCAI401 is 3
4	BCAI303	DBMS Lab	New	Credit point of BCAI303 is 2
5	BCAIAI301	Statistics and Probability	New	Credit point of BCAIAI301 is 4
6		Elective-I	New	Credit point of Elective-1 is 3
7	BCAI303	DBMS Lab	New	Credit point of BCAI303 is 2
8	BCAI304	Business communication and Presentation Skills	New	Credit point of BCAI304 is 2
9	BCAI305	SUMMER PPROJECT 1 ,SEMINAR1	NEW	Credit point of BCAI305 is 1
10	BCAIAI302	Digital Electronics	New	Credit point of BCAI302 is 3
	BCAIAI303	Elective-I	New	Data Visualization
	BCAIAI304		New	Business Intelligence

Fourth Semester:

S. No.	CODE	SUBJECT NAME	STATUS	REMARKS
1	BCAIAI401	Introduction to RPA Tools	New	Credit point of BCAIAI401 is 3
2	BCAIAI402	Introduction to Artificial Intelligence	New	Credit point of BCAIAI402 is 3
3	BCAIAI403	Sensor Technology	New	Credit point of BCAIAI403 is 3
4	BCAIAI404	Business Process Management	New	Credit point of BCAIAI404 is 3
5		Elective-II	New	Credit point of ElecticeII is 3
6	BCAI403	Logical Reasoning and Thinking	New	Credit point of BCAI403 is 2
7	BCAIAI407	Introduction to Artificial Intelligence Lab	New	Credit point of BCAIAI407 is 2
8	BCAIAI408	Introduction to RPA Tools Lab	New	Credit point of BCAIAI408 is 2
	BCAIAI405	Elective-II	New	Introduction to Data Science
	BCAIAI406		New	Pattern Recognition

Fifth Semester:

S. No.	CODE	SUBJECT NAME	STATUS	REMARKS
1	BCAIAI501	Six Sigma and Lean Methods	New	Credit point of BCAIAI501 is 3
2	BCAIAI502	Digital Image Processing	New	Credit point of BCAIAI502 is 3
3		Elective –III	New	Credit point of Elective –III is 2
4		Elective – IV	New	Credit point of Elective – IV is 3
		Elective – V	New	Credit point of Elective – V is 3
5		Generic Elective-I	New	Credit point of Generic Elective-I is 3
7	BCAIAI511	Digital Image Processing Lab	New	Credit point of BCAIAI511 is 2
8		Program Elective – III Lab	New	Credit point of Program Elective – III Lab is 1
	BCAI501	Mini Project		Credit point of BCAI501 is 4
	BCAI502	Working Towards Placements		Credit point of BCAI502 is 2
	BCAI503	Summer Project Seminar II		Credit point of BCAI503 is 1
	BCAIAI503	Elective III	New	Test Automation using Selenium
	BCAIAI504		New	Software Testing
	BCAIAI505	Elective IV	New	Introduction to web Services
	BCAIAI506		New	Digital Signal Processing
	BCAIAI507	Elective V	New	Embedded Systems
	BCAIAI508		New	Design Thinking
	BCAIAI509	Generic Elective-I	New	Introduction to IoT
	BCAIAI510		New	Cloud Computing
	BCAIAI512	Program Elective – III Lab	New	Test Automation using Selenium Lab
	BCAIAI513		New	Software Testing Lab

Sixth Semester:

S. No.	CODE	SUBJECT NAME	STATUS	REMARKS
1	IIOT6	Artificial Intelligence for IIOT	New	Credit point of IIOT5 is 4
2	BCAI60	Major Project / Internship	New	Credit point of IIOT5 is 20

ANNEXURE II (New Scheme of BCA Cloud Technology and Information Security)

SEM- I				
S. NO.	**CODE**	**SUBJECT NAME**	**STATUS**	**REMARK**
1	BCAI101	English-I	New	Credit point of BCAI101 is 3
2	BCAI102	Theory of Mathematics	New	Credit point of BCAI102 is 3
3	BCAI103	Computer Architecture & Organization	New	Credit point of BCAI103 is 3
4	BCAI104	Programming in C	New	Credit point of BCAI104 is 3
5	BCAI105	Client Side scripting	New	Credit point of BCAI105 is 3
6	BCAI106	Office Automation Lab	New	Credit point of BCAI106 is 2
7	BCAI107	Programming in C Lab	New	Credit point of BCAI107 is 1
8	BCAI108	Client Side scripting Lab	New	Credit point of BCAI108 is 2
9	BCAI109	Effective Communication Skills	New	Credit point of BCAI109 is 2
SEM-II				
1	BCAI201	English-II	New	Credit point of BCAI201 is 3
2	BCAI202	Linux Shell Scripting	New	Credit point of BCAI202 is 3
3	BCAI203	Object Oriented Programming Using Java	New	Credit point of BCAI203 is 2
4	BCAI204	Operating Systems	New	Credit point of BCAI204 is 3
5	BCAI205	Data Structures using C	New	Credit point of BCAI205 is 3
6	BCAI206	Environmental Studies	New	Credit point of BCAI206 is 3
7	BCAI207	Data Structures using C Lab	New	Credit point of BCAI207 is 2
8	BCAI208	Linux Shell Scripting Lab	New	Credit point of BCAI208 is 1
9	BCAI209	Object Oriented Programming Using Java Lab	New	Credit point of BCAI209 is 2
10	BCAI210	Personality Development	New	Credit point of BCAI210 is 2
SEM-III				
1	BCAI301	DBMS	New	Credit point of BCAI301 is 3
2	BCAI302	Computer Networks	New	Credit point of BCAI302 is 3
3	BCAICT301	Information Security	New	Credit point of BCAICT301 is 3
4	BCAICT302	Principles of Virtualization	New	Credit point of BCAICT302 is 2
5	BCAICT303	Cloud Computing	New	Credit point of BCAICT303is 3
6		Elective-I	New	Credit point of Elective-I is 3
7	BCAI303	DBMS Lab	New	Credit point of BCAI303 is 2
8	BCAICT306	Principles of Virtualization	New	Credit point of BCAICT306 is 1

		Lab		
9	BCAI304	Business communication and Presentation Skills	New	Credit point of BCAI304 is 2
10	BCAI305	Summer Project Seminar I	New	Credit point of BCAI305 is 1
SEM IV				
1	BCAICT401	.Net framework using C#	New	Credit point of BCAICT401 is 3
2	BCAI401	Storage and Datacentre	New	Credit point of BCAI401 is 3
3	BCAICT402	Python Programming	New	Credit point of BCAICT402 is 3
4	BCAICT403	Cloud Web services	New	Credit point of BCAICT403is 3
5		Ethical Hacking	New	Credit point of Ethical Hacking is 3
6	BCAICT406	Elective-II	New	Credit point of BCAICT406 is 2
7	BCAI402	Ethical Hacking Lab	New	Credit point of BCAI402 is 1
8	BCAICT407	Python Programming Lab	New	Credit point of BCAICT407 is 1
	BCAI403	Cloud Web Services Lab	New	Credit point of BCAI403 is 2
SEM V				
1	BCAICT501	Digital Forensics and Investigation	New	Credit point of BCAICT501 is 2
2	BCAICT502	BCAICT502Cloud Migration	New	Credit point of BCAICT502is 2
3		Elective -III	New	Credit point of Elective -III is 2
4		Elective - IV	New	Credit point of Elective -IV is 2
5		Elective -V	New	Credit point of Elective –V is 2
6		Generic Elective – I	New	Credit point of Generic Elective – I is 2
7	BCAICT511	Digital Forensics and Investigation Lab	New	Credit point of BCAICT511 is 2
8		Elective – III Lab	New	Credit point of Elective – III Lab is 2
9	BCAI501	Mini Project	New	Credit point of BCAI501 is 2
10	BCAI502	Working Towards Placements	New	Credit point of BCAI502 is 2
11	BCAI503	Summer Project Seminar II	New	Credit point of BCAI503 is 2

COURSE CODE	**Program Elective-III**
BCAICT503	PowerShell Scripting
BCAICT504	Infrastructure Automation

COURSE CODE	**Program Elective-IV**
BCAICT505	Cloud Security
BCAICT506	Application and Web Security

COURSE CODE	**Program Elective-V**
BCAICT507	IT Governance, Risk, & Information Security Management
BCAICT508	Infrastructure Solutions on Cloud

COURSE CODE	Program Elective-III Lab
BCAICT512	PowerShell Scripting Lab
BCAICT513	Infrastructure Automation Lab

COURSE CODE	Generic-Elective-I
BCAICT509	IT Governance, Risk, & Information Security Management
BCAICT510	Infrastructure Solutions on Cloud

SEM VI

1	BCAI601	Major Project / Internship	New	Credit point of BCAI601 is 2

Date: 13/02/2021

To
Dean Academics
Invertis University
Bareilly

Sub: Regarding organizing pre-BOS

Respected sir,

In pursuance of introducing new programs the schemes for BCA (Cloud) and BCA (AI) based on the recommendations by CRC and PRC reports, we are organizing a pre-BOS on 15/02/2021 at Conference Hall (AB-III) from 3:30 PM.

We request you to give permission to conduct the pre-BOS so that we can put forward the recommended points.

Thanking You.

(Mr. Jitendra Kumar Chaudhary)
HOD
Dept. of Computer Applications.

Department of Computer Applications
Invertis University
MINUTES of MEETING of Pre-BOS

Organizer: Mr. Jitendra Kumar Chaudhary

Date: 15/02/2021
Time: 3:30 PM
Venue: Conference Hall (AB-III)

Organizer welcomed and briefed the committee members about the agenda. The agenda of the meeting was discussed as under:

1: To introduce new programs, the schemes of BCA (Cloud) and BCA (AI).

The recommendations put forward by PRC after a review of report submitted by CRC is to be taken into consideration and suggested changes are put forward to the BOS for approval.

2: To introduce new schemes of BCA (Cloud) and BCA (AI), since number of years of the courses is 3 years

The recommendations put forward by PRC after a review of report submitted by CRC is to be taken into consideration and suggested changes are put forward to the BOS for approval.

3: To introduce the schemes of BCA (Cloud) and BCA (AI)

The recommendations put forward by PRC after a review of report submitted by CRC is to be taken into consideration and suggested changes are put forward to the BOS for approval.

A thorough review of the suggestions are done and complete report is put forward to BOS committee.

ANNEXURE-IV(Attendance)

1. Mr. Jitendra Kumar Chaudhary
2. Mr. Amit Taneja
3. Mohd. Shakeel
4. Mr. Kushal Johari
5. Ms. Archana Saxena
6. Ms, Shivangi Ghildiyal

Date: 17/02/2021

To
Vice-Chancellor
Invertis University
Bareilly

Sub: Regarding organizing BOS

Respected sir,

In pursuance of to introduce new programs, the schemes of BCA (Cloud) and BCA (AI) based on the recommendations by CRC and PRC reports, we are organizing a BOS on 10/03/2021 at Conference Hall (AB-III) from 3:30 PM onwards.

We request you to give permission to conduct the BOS so that we can finalize on the recommended points by pre-BOS and do the necessary modifications in the scheme.

Thanking You.

Mr. Jitendra Kumar Chaudhary
HOD
Dept. of Computer Applications.

Analysis report of Feedback Forms on Design and Review of Syllabus (2021-22)

Feedback was prepared with the help of questionnaires. Feedback forms were collected from alumni. Response expected from them on curriculum was record by using 5-point scale.

Alumni Feedback Analysis on Design and Review of Syllabus

Total Form collected-

Sr. No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Curriculum fulfills the objectives of the course.	11	16	1	1	1
2	Curriculum helps in overall personality development.	8	15	4	1	2
3	Curriculum enhances employability.	7	15	4	2	2
4	Skill based content in Curriculum.	8	13	4	3	1
5	Curriculum is effective in constructive learning.	7	15	6	0	2
6	Curriculum is effective in developing analytical and problem-solving skills.	8	13	5	2	2
Total =		49	87	24	9	10

Analysis report of Feedback Forms on Design and Review of Syllabus (2021-22)

Feedback was prepared with the help of questionnaires. feedback forms were collected from teachers. Response expected from them on curriculum was recorded on following 5-point scale.

Teacher Feedback Analysis on Design and Review of Syllabus

Total Responses collected

Sr. No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Objectives of curriculum are fair and impartial.	7	3	0	0	0
2	Employability is given weightage in curriculum design and development.	9	1	0	0	0
3	Program outcomes of the curriculum are well defined.	7	3	0	0	0
4	Curriculum has been updated from time to time.	9	1	0	0	0
5	Curriculum having good academic flexibility.	6	4	0	0	0
6	Curriculum helps in improving personality development of students.	6	4	0	0	0
Total =		44	16	0	0	0

FACULTY OF COMPUTER APPLICATION

Scheme & Syllabus
For
Bachelor of Computer Application
(Specialization in Cloud Technology and Information Security)

(Implemented from Academic Session ____)

Version			
Applicable for Back Examination(Session)	Nil		
Date of BOS/BOF/AC			
Page No. Where Major/Minor Changes have been done	First Version (Not Applicable)		
Implemented from (Session)			
Scheme and Syllabus Page Number			

Total Credit of the Program

Sem	I	II	III	IV	V	VI	Total
Credits	22	24	23	21	27	20	137

FACULTY OF COMPUTER APPLICATION

Bachelor of Computer Application
(Specialization in Cloud Technology and Information Security)

Evaluation Scheme

Marks	Theory	Practical	Dissertation/Thesis
Maximum Marks	100	100	100
Internal Marks	40%	60%	20%
External Marks	60%	40%	80%

- **Practical and theory courses are mentioned in the form of L-T-P, Where**
  L- Lecture
  T- Tutorial
  P- Practical

- **Elective courses are clearly Mentioned as "Elective" if more than one than "Elective-I, II…"**

- **Any zero Credit courses are Treated as Pass/Audit Course**

Scheme

L*-Lecture, T*-Tutorial, P*-Practical

TEACHING AND EXAMINATION SCHEME FOR

BCA (Common for all Specializations CTIS, DS, UI/UX, IPA)

Semester I

S. No.	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAI101	ENG	English-I	3	0	0	3	3
2	BCAI102	BS	Theory of Mathematics	3	0	0	3	3
3	BCAI103	PC	Computer Architecture & Organization	3	0	0	3	3
4	BCAI104	PC	Programming in C	3	0	0	3	3
5	BCAI105	PC	Client Side scripting	3	0	0	3	3
6	BCAI106	PC	Office Automation Lab	0	0	4	4	2
7	BCAI107	PC	Programming in C Lab	0	0	2	2	1
8	BCAI108	PC	Client Side scripting Lab	0	0	4	4	2
9	BCAI109	HSM	Effective Communication Skills	0	0	4	4	2
TOTAL				15	0	14	29	22

CTIS – Cloud Technology and Information Security
DS – Data Science
UI/UX – User Interface/User Experience
IPA – Intelligent Process Automation

TEACHING AND EXAMINATION SCHEME FOR

BCA (Common for all Specializations CTIS, DS, UI/UX, IPA)

Semester II

S.No.	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAI201	ENG	English-II	3	0	0	3	3
2	BCAI202	PC	Linux Shell Scripting	3	0	0	3	3
3	BCAI203	PC	Object Oriented Programming Using Java	2	0	0	2	2
4	BCAI204	PC	Operating Systems	3	0	0	3	3
5	BCAI205	PC	Data Structures using C	3	0	0	3	3
6	BCAI206	BS	Environmental Studies	3	0	0	3	3
7	BCAI207	PC	Data Structures using C Lab	0	0	4	4	2
8	BCAI208	PC	Linux Shell Scripting Lab	0	0	2	2	1
9	BCAI209	PC	Object Oriented Programming Using Java Lab	0	0	4	4	2
10	BCAI210	HSM	Personality Development	0	0	4	4	2
TOTAL				17	0	14	31	24

CTIS – Cloud Technology and Information Security
DS – Data Science
UI/UX – User Interface/User Experience
IPA – Intelligent Process Automation

TEACHING AND EXAMINATION SCHEME FOR

BCA (Specialization in CTIS)

Semester III

S.No.	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAI301	PC	DBMS	3	0	0	3	3
2	BCAI302	PC	Computer Networks	3	0	0	3	3
3	BCAICT301	PC	Information Security	3	0	0	3	3
4	BCAICT302	PC	Principles of Virtualization	2	0	0	2	2
5	BCAICT303	PC	Cloud Computing	3	0	0	3	3
6		PE	Elective-I	3	0	0	3	3
7	BCAI303	PC	DBMS Lab	0	0	4	4	2
8	BCAICT306	PC	Principles of Virtualization Lab	0	0	2	2	1
9	BCAI304	HSM	Business communication and Presentation Skills	0	0	4	4	2
10	BCAI305	ST	Summer Project Seminar I	0	0	2	2	1
			TOTAL	17	0	12	29	23

CTIS – Cloud Technology and Information Security

Course Code	Program Elective I
BCAICT 304	Server Administration
BCAICT 305	Linux Administration

TEACHING AND EXAMINATION SCHEME FOR

BCA (Specialization in CTIS)

Semester IV

S. No	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P		
1	BCAICT401	PC	Storage and Datacenter	3	0	0	3	3
2	BCAI401	PC	Python Programming	3	0	0	3	3
3	BCAICT402	PC	Cloud Web services	3	0	0	3	3
4	BCAICT403	PC	Ethical Hacking	3	0	0	3	3
5		PE	Elective-II	3	0	0	3	3
6	BCAICT406	PC	Ethical Hacking Lab	0	0	4	4	2
7	BCAI402	PC	Python Programming Lab	0	0	2	2	1
8	BCAICT407	PC	Cloud Web Services Lab	0	0	2	2	1
9	BCAI403	HSM	Logical Reasoning and Thinking	0	0	4	4	2
			TOTAL	15	0	12	27	21

CTIS – Cloud Technology and Information Security

Course Code	Program Elective-II
BCAICT404	Network Security
BCAICT405	Database security fundamentals

TEACHING AND EXAMINATION SCHEME FOR

BCA (Specialization in CTIS)

Semester V

S. No.	COURSE CODE	COURSE TYPE	COURSE NAME	L*	T*	P*	CONTACT HOURS	CREDIT POINTS
1	BCAICT501	PC	Digital Forensics and Investigation	3	0	0	3	3
2	BCAICT502	PC	Cloud Migration	3	0	0	3	3
3		PE	Elective -III	3	0	0	3	3
4		PE	Elective - IV	3	0	0	3	3
5		PE	Elective -V	3	0	0	3	3
6		GE	Generic Elective – I	3	0	0	3	3
7	BCAICT511	PC	Digital Forensics and Investigation Lab	0	0	2	2	1
8		PE	Elective – III Lab	0	0	2	2	1
9	BCAI501	PR	Mini Project	0	0	8	8	4
10	BCAI502	HSM	Working Towards Placements	0	0	4	4	2
11	BCAI503	ST	Summer Project Seminar II	0	0	2	2	1
			TOTAL	18	0	18	36	27

CTIS – Cloud Technology and Information Security

COURSE CODE	Program Elective-III
BCAICT503	PowerShell Scripting
BCAICT504	Infrastructure Automation

COURSE CODE	Program Elective-IV
BCAICT505	Cloud Security
BCAICT506	Application and Web Security

COURSE CODE	Program Elective-V
BCAICT507	IT Governance, Risk, & Information Security Management
BCAICT508	Infrastructure Solutions on Cloud

COURSE CODE	Program Elective-III Lab
BCAICT512	PowerShell Scripting Lab
BCAICT513	Infrastructure Automation Lab

COURSE CODE	Generic-Elective-I
BCAICT509	IT Governance, Risk, & Information Security Management
BCAICT510	Infrastructure Solutions on Cloud

TEACHING AND EXAMINATION SCHEME FOR

BCA (Specialization in CTIS)

Semester VI

S.No.	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAI601	ST	Major Project / Internship	-	-	40	40	20
			TOTAL	-	-	40	40	20

CTIS – Cloud Technology and Information Security

Syllabus
Semester – I

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-101: English-I

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:* To train students to be comfortable with everyday communication. Training the students in English grammar.

Unit I: Everyday Conversations

- Introducing self / others
- Weather
- Classroom
- Asking about facilities around
- Describing a person / thing

Points to cover: Vocabulary, grammar, Construction of sentences, listening.
Methodology: Role plays, Videos, Classroom conversation, worksheets.

Unit II: Asking for.

- Help/ Suggestion/ ideas
- Clarification/ Directions
- Time/ food
- Advice
- Uses

Points to cover: Vocabulary, grammar, Construction of sentences, listening.
Methodology: Role plays, Videos, Classroom conversation, worksheets.

Unit III: Reporting/ Describing

- Incidences
- Personalities
- Experiences
- Wants/Needs
- Intentions

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Unit IV: Meeting People

- Greetings
- Starting the Conversation
- Small talks
- Closing the conversation

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Unit V: Expressing

- Happiness/Displeasure
- Preferences
- Doubts
- Views
- Unawareness

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Talking about….

- Interests
- Different Cultures
- Clothes , cars, institutes, situations
- Schedules, prices

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Text Books:

1. Speak Now Level I & II, Oxford Press
2. Business Benchmark, Level – Upper Intermediate by Cambridge University Press.

Reference Books:

1. Practical English Usage by Michel Swan, Oxford University Press
2. Cambridge Grammar for English: A comprehensive Guide for spoken & written English (South Asian edition), Cambridge University Press.

Course Outcome:

The students will have a better understanding of English grammar. The students will be able to use grammar more effectively in their verbal and written communication.

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-102: Theory of Mathematics

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To develop the skills in the areas of Matrices, Sets, relations and functions, Differentiation and Integration.
- Mathematics concepts serves as a pre-requisite for post graduate courses, specialized studies and research.

Unit I: Sets, relations and functions

Definition of Set, Type of Sets, Operations on Sets, Venn diagram, Cartesian Product, Relations, Functions, Types of function, Some elementary functions with their graphs (Exponential, logarithmic, modulus), Limit & continuity of a function (Simple Problems).

Unit II: Matrices and Determinants

Types of Matrices, Operations of addition, Scalar Multiplication and Multiplication of Matrices, Determinant of a Square Matrix, Minors and Cofactors, Transpose, adjoint and inverse of a matrix, solving system of linear equations, in two or three variables using inverse of a matrix.

Unit III: Limits, Continuity and Differentiation

Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities. Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions

Unit IV: Coordinate Geometry

2D Cartesian Co-ordinate system, Straight line: (Equation & Slope of a line), Circle: Equation of Circle, Equation to Tangent, Conic Sections: Focus, Eccentricity, Directrix, Axis of a conic section, Parabola & Ellipse: (Definitions, equations and shape of curve only)

Unit V: Statistics and Probability

Introduction, definition, terminologies in statistics and probability, measure of central tendency and dispersion, probability distribution – continuous and discrete, Bayes theorem, testing of hypothesis, basics of ANOVA, Correlation and Regression Analysis.

Text Book:

1. Mathematics for BCA by G. C. Sharma & Madhu Jain, Oscar Publication
2. Mathematics Vol-2 by R. D. Sharma, Dhalpat Raj & Sons

Reference Books:

1. The Elements of Co-ordinate Geometry Part-I by S. L. Loney, Book Palace, New Delhi.

Course Outcome:

After completion of the course the student will be able:

- To know and define the use of basic concepts of Matrices.
- To apply the concept of set relation and functions in functions.
- To know the methods and rules of calculus.
- To understand the basics 2D Cartesian Co-ordinate system, Straight line.
- To know the basics of statistics and probability for computer science.

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-103: Computer Architecture & Organization

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To understand the fundamentals of computer organization and architecture and to relate these to contemporary design issues. Understanding the performance characteristics of computer system.

Unit I: Register Transfer and Micro-operation

Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. Arithmetic Micro-operations: Binary Adder, Binary Adder-Subtrator, Binary Incrementor, Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit.

Unit II: Basic Computer Organization

Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions.

Unit III: Micro Programmed Control Unit

Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines, Design of Control Unit, Central Processing Unit: Introduction, General Register Organization, Stack Organization: Register stack, Memory stack; Instruction Formats, Addressing Modes.

Unit IV: Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms, Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors.

Unit V: Modes of Data Transfer and Memory Organization

Modes of Data Transfer: Priority Interrupt, Direct Memory Access, Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory

Text Books:

1. Computer System Architecture by Morris Mano, PHI
2. Computer Organization and Architecture by William Stallings, PHI

Reference Books:

1. Digital Computer Electronics: An Introduction to Microcomputers by Malvino, TMH
2. PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson, O'Reilly, 2nd Edition , 2010
3. Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons
4. Fundamental Of computer Organization by Albert Zomaya, 2010.

Course Outcome:

- Explain the use of basic concepts of Computer components.
- Discuss the Register Transfer and different Micro-operations
- Illustrate the flowchart for Instruction cycle
- Describe the function of Control Unit and Central Processing Unit
- Explain the characteristics of multi-processors.
- Discuss the modes of Data transfer and Memory organization

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-104: Programming in C

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments.
- The object oriented platforms and event driven systems use procedural languages for coding integral command content. C is an important procedural language and was developed initially to write the UNIX operating system.
- UNIX operating system, C compiler and all UNIX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms.
- This course focuses on all the basic concepts, syntax and constructs of the C language. For students, who are new to programming, this unit can be considered as the starting point before taking up any other programming oriented units.
- The students will be implementing the concepts explained here to create simple to complex programs.

Unit I: Introduction to Programming:

Problem Solving Using Computers**:** Language Classification, Problem Analysis, Algorithm and Flowchart design. **Algorithms:** Steps in developing algorithms, advantages and disadvantages. **Flowcharts:** Symbols used in developing flowcharts, advantages and disadvantages. Coding, testing, debugging, Documentation and maintenance. Program development and modular design.

Unit II: Fundamentals of C programming and Control Structures:

History, Structure of a C program, C Conventions, Character Set, Identifiers, Keywords, Simple Data types, Modifiers, Variables, Constants, Operators (Arithmetic operator, relational operator, logical operator, ternary operator, unary operator, shorthand operator, bit-wise operator and arithmetic operator) Operator precedence. Input and Output operation: Single character input and output, formatted input and output, Buffered input.

Control Structures: Introduction, Conditional statement, if statement, if-else statement, nested if statement, else-if statement and switch statement. Goto statement. Looping statement, while statement, do-while statement, for statement, break and continue, nested for statement

Unit III: Arrays and Functions:

Arrays: Introduction (One and multi-dimensional), Declaration of arrays, Initialization of arrays, processing with arrays. String manipulation, declaration of string arrays, string operations.
Functions: Introduction, advantages of subprograms, Function definition, function call, Actual and formal arguments, local and global variables, function prototypes, types of functions, recursive functions, arrays and functions.

Unit IV: Storage Classes, Structures, Unions and Pointers:

Storage Classes, Structures and Unions: Introduction, types of storage classes, Introduction to structures, Advantages of structures, accessing elements of a structure, nested structures, array of structures, functions and structures, Unions, bit-fields, enumerated data types.

Pointers: Introduction, pointer variable, pointer operator, pointer arithmetic, pointers and arrays, pointers and strings, array pointers, dynamic allocation

Unit V: Files, Preprocessor, standard library and header files:

Files: Introduction, File data type, opening and closing a file, file functions (getc, putc, getw, putw, fscanf, fprintf, fread, fwrite, fgets, fputs, feof).

Preprocessor: #define, #include, #undef, Conditional compilation directives, **C standard library and header files**: Header files, string functions, mathematical functions, Date and Time functions

Text Book:

1. Forouzon A Behrouz, Gilberg F Richard, A Structured Programming Approach using C - 3rd Illustrated Edition, 2009.
2. Kanetkar, Yashavant: "Let Us C", 6th Edition. BPB Publications.
3. Balagurusamy, E: "Programming in ANSI C" 3rd Edition. Tata McGraw-Hill

Reference Books:

1. The C programming Language by Richie and Kernighan, 2004, BPB Publication
2. Gottfried, Byron S: "Programming with C", 1996. Tata McGraw-Hill
3. Deitel, H M and Deitel P J: "C How to Program", 2nd Edition. Prentice-Hall

Course Outcome:

After completion of the course the student will be able:

- To be able to use the basic concepts of Computer components.
- To be able to design, implement, test, debug and document programs in C.
- To be able to use functions, and functions with parameters passing option.
- To be able to use pointers and arrays, perform pointer arithmetic.
- To be able to understand the advance topics in C like file handling functions and the concept of Standard C library.
- To be able to learn the concept of C preprocessor and its application in program development.

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-105: Client Side Scripting

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To introduce students to web technologies such as HTML, CSS, XML, Java Script teach them to create static and simple dynamic web pages or applications using these technologies and to understand web application deployment and software architectures.
- Students will learn basic web application design, development and testing skills.
- On completion of this course the learner should be able to design and implement a variety of dynamic Website

Unit I: Introduction to the Internet and the World Wide Web

Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture
Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development. HTML, CSS, JS, XML; HTTP, secure HTTP, etc.; URL, Web Services – SOAP, REST.

Unit II: HTML, CSS & JavaScript

Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images.
Introduction to CSS, Syntax, Selectors ,Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing.
Introduction to JavaScript: Data types, variables, operators, expressions, statements, functions, objects, arrays, date, math, error handling, flow control, loops

Unit III: XML and HTML5, CSS3

Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM.
Introduction to HTML5, CSS3, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geolocation, Microdata, Drag and Drop. Browser life cycle and browser rendering stages. Service workers.

Unit IV: Practical website development

Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures, web authoring tools, Web hosting, website maintenance, generating traffic to your website.

Unit V: PHP Server side scripting

Introduction to PHP, Basic Syntax, Variables, constants and operators, Loops, Arrays and Strings, Environment & environment variables, responding to HTTP requests, Files, Cookies, Sessions, Examples.

Text Books:

1. Practical Web Design for Absolute Beginners, Adrian W. West. Apress 2016
2. Introducing Web Development, Jorg Krause. Apress 2017.
3. HTML & CSS: The Complete Reference, Thomas Powell. McGraw Hill, Fifth Edition, 2010
4. Creating a Website: The Missing Manual, 3rd Edition, Mathew Macdonald. O'Reilly
5. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax Black, Kogen Learning Systems (Dreamtech Press), 5th Edition 2009.

Reference Books:

1. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow- Wiley Publishing Inc, 2010
2. HTML5 & CSS3 for the Real World, 2 Edition, Alexis Goldstein, Estelle Weyl, Louis Lazaris. Apress 2015.
3. HTML5 & CSS3 for Dummies, Andy Harris. Wiley 2014.
4. Learning PHP A Gentle Introduction to the Web's Most Popular Language, David Sklar. O'Reilly 2016.
5. Build Your Own Database Driven Web Site Using PHP & MySQL, Kevin Yank. Sitepoint , 4th Edition, 2009.

Course Outcome:

Students will gain the knowledge and skills required to develop Simple Web Applications. They should be able to:

- Explain basic Client-Server web architecture
- Understand working of web protocols like HTTP, TCP/IP, DNS as well as IP and web address resolution schemes such as URIs/URLs and DNS
- Use and recognize commonly used HTTP request and response messages
- Differentiate and create both static and dynamic web applications
- Understand and use HTML/CSS and XML
- Create static web pages using HTML & CSS
- Understand and use PHP for server side scripting
- Create simple dynamic web pages supporting user interaction using HTML, CSS &Java Script

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-106: Office Automation Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

1. Installing Operating Systems and Basic Software

2. **MS Word**

1. Prepare a document about any tourist destination of your choice with appropriate pictures and editing features.

2. Prepare a News Paper Layout. Insert appropriate pictures wherever necessary. Use the following Features:

- •Three Column and Four Column setting
- •Set One or Two Advertisements
- •Use Bullets and Numbering.

3. Create a Document consisting of Bio-data. It includes

- •A table giving your qualification and/or experience of work. Table should be Bordered and Shaded.
- •A Multilevel list giving your areas of interest and further areas of interest. The sub areas should be numbered as
- •'a', 'b', etc while the areas should be numbered as '1', '2', etc.
- •The information should be divided in “General” and “Academic” sections.
- •The header should contain “BIO-DATA” while the footer should have page numbers in the format Page 1 of 10.
- •Assign a password for the document to protect it from unauthorized access.

4. Assume that you are coordinating a seminar in your organization. Write a letter to 10 different IT companies asking them to participate in the seminar using mail merge facility.

5. Prepare a document which contains template of marks card of students. Assume that there are 10 students. The footer for the document should be ' University Name '.

6. Prepare a document about any topic In mathematics which uses mathematical symbols. (At least 5 mathematical symbols should be used). Assign a password for the document to protect it from unauthorized access. Demonstrate the use of Hyperlink Option. Sets margins to your document, a font of size and double spaced document.

3. MS – Excel

1. Open a new workbook, save it as JavaCoffeeBar.xls. In sheet1 write following sales data for Java Coffee bar to show their first 6 months sales.
   - •Select cell B4:D4 and change the horizontal alignment to center and text to 90 degree.
   - •All titles should be in bold
   - •Format all cells numbers to currency style and adjust width as necessary.
   - •Add border to data.
   - •Select the cell range A1:H1, merge and center these cells. Apply same format to A2:H2.
   - •Give border, shading and pattern to data in sheet
   - •Apply different font settings for all titles in sheet
   - •Apply green color and bold setting to sales above 10000 (use conditional formatting)
   - •Rename current worksheet as FirstHalfSales
2. Prepare a worksheet to maintain student information. The work sheet should Contain Roll Number, Name and marks in 5 subjects. (Max Marks is 100).Validate the marks. Calculate the total marks. Assign the grade according to the following. Assign grade 'A' if the total marks is above 450. From 401 to 449 assign the grade as 'B'. From 351 to 400 assign the Grade as 'C'. From 300 to 350 the grade to be assigned is 'D'. For the total marks less than 300 No grade is assigned. A student is eligible to get a grade only when he gets 40 and above in all the subjects. In such cases the grade is “FAIL”. (Assume that there are 10 students).
3. Prepare a pay-bill using a worksheet. The work sheet should contain Employee Id, Name, Designation, Experience and Basic Salary and Job ID. If Job Id is 1 then DA is 40% of the basic salary. HRA is Rs. 4500. If Job Id is 2 then DA is 35% of the basic salary. HRA is Rs. 3500. If Job Id is 3 then DA is 30% of the basic salary. HRA is Rs. 2500. If Job Id is 4 then DA is 25% of the basic salary and HRA is RS.2500. For all the other Job ids DA is 20% of the basic salary and HRA is Rs. 1500. For all the above Job ids PF to be deducted is 4%. For the job ids between 1-4Rs. 100 to be deducted as Professional Tax. Find the net pay.
4. For the above employee worksheet perform the following operations
   - Use filter to display the details of employees whose salary is greater than 10,000.
   - Sort the employees on the basis of their net pay
   - Use advance filter to display the details of employees whose designation is "Programmer” and Net Pay is greater than 20,000 with experience greater than 2 yrs

11. Using Excel project the Product sales for any five products for five years.
    - Compute the total sales of each product in the five years.
    - Compute the total sales of all the products in five year.
    - Compute the total sales of all products for each year.
    - Represent annual sale of all the products using Pie-Chart.

- Represent annual sales of all products using Bar Chart.
- Represent sale of a product for five years using Pie-Chart.
- Label and format the graphs

12. Create a statement of Telephone Bill Charge for a customer.
    - Telephone Calls
    - Up to 150 calls- free
    - 151 to 500 calls- 0.80 per call
    - 501 to 1000 calls- 1.00 per call
    - 1001 to 2000 - 1.25 per call
    - Above 2000- 1.40 per call
13. Perform Following:
    - Using Excel write sales data with columns product, month and sales. Write at least 5 records. Create Pivot Table chart and Report for the data.
    - Create a macro to change the name of worksheet as Macro Example, merge first three columns of first row and write heading as DATA in green color with yellow background
    - Link word document in excel worksheet to show the usage of linking and embedding.

4. MS – PowerPoint

14. Assume that you are going to give a presentation about Information Technology. (Choose some latest technologies). The presentation should have minimum 10 slides. Insert appropriate images wherever necessary. Use proper formatting, Diagrams and tables. Show the usage of action buttons, hyperlinks, and animations.

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-107: Programming in C Lab

L=0, T=0, P=2, C=1 **MM 100**

Part A

1. Printing the reverse of an integer.
2. Printing the odd and even series of N numbers.
3. Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().
4. Input a string and find the number of each of the vowels appear in the string.
5. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
6. Printing the reverse of a string.

Part B

1. Searching an element in an array using pointers.
2. Checking whether the given matrix is an identity matrix or not.
3. Finding the first N terms of Fibonacci series.
4. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.
5. Define a structure with three members and display the same.
6. Declare a union with three members of type integer, char, string and illustrate the use of union.
7. Recursive program to find the factorial of an integer.
8. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
9. Arranging N numbers in ascending and in descending order using bubble sort.
10. Addition and subtraction of two matrices.
11. Multiplication of two matrices.
12. Converting a hexadecimal number into its binary equivalent.
13. Check whether the given string is a palindrome or not.
14. Demonstration of bitwise operations.
15. Applying binary search to a set of N numbers by using a function.
16. Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-108: Client Side Scripting Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

1. Design a simple web page with head, body and footer, with heading tags, image tag
2. Design a web site for book information, home page should contain books list, when particular book is clicked, information of the books should display in the next page.
3. Design a page to display the product information such as name, brand, price and etc with table tag
4. Design a web site for book information using frames, home page should contain two parts, left part should contain books list, and right part should contain book information.
5. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements.
6. Design a web page with nice formatting like background image, text colors and border for text using external CSS.
7. Design a web page to perform mathematical calculations such as addition, subtraction, multiplication, and division using form elements and Java Script.
8. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements and display them into other pages using Java Script.
9. Design a web page to display timer in the left side of the web page using Java Script.
10. Design a web page to capture the student details such as student number, name, age, marks using Java Script Object.
11. Design a web page to read data from an XML file and display the data in tabular format, take the data as employee information.
12. Design a web site for online purchase using CSS, JS and XML, web site should contain the following web pages.
    - Home page
    - Login page
    - Signup page
    - Product details page
13. Design a web site for Student details using PHP, web site should contain the following web pages.
    - Home page
    - Login page
    - Signup page
    - Student details page

Semester I **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-109: Effective Communication Skills

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To train students in how to be effective communicators by practicing various skills and also help them in becoming well-groomed individuals in terms of both verbal and non-verbal communication

Unit I: Communication Process

What is communication? The communication model, elements of communication, Importance of effective communication skills in the business world, Components of Communication Process, practicing effective communication, good communication Vs effective communication, styles of communication, intercultural communication skills- need for attitude change and benefits

Unit II: Types of Communication & Barriers to communication

Verbal Communication, Non Verbal Communication, Written Communication, Do's and don'ts of each type, barriers to effective communication and how to overcome them, interaction of verbal and non-verbal communication, talents of a corporate communicator, silence- merits and limitations of each type

Unit III: Listening Skills & Reading Skills

What is listening, various types of listening – Active, passive, selective, listening and note taking, listening and comprehending, listening to speak, principles of good listening
Techniques to develop effective listening skills, Reading Skills- skimming, scanning and inferring- common reading techniques, practicing smart reading.

Unit IV: Conversation Skills

Importance of conversation skills, features of a good conversation, Tips to improve Conversation skills, importance of questioning skills, techniques to ask right questions- role play situations to practice the same, discussing issues (social, political and cultural), formal and informal conversation

Unit V: Telephone Etiquette

Basic rules of telephone etiquette- formal vs. informal; tone, pitch and vocabulary related to formal ways of speaking over the phone, leaving voice messages; practice sessions (role plays)

Persuasive communication

What is persuasive communication, different techniques of persuasive communication, How to negotiate using persuasive communication, the act of negotiation, negotiation style and their contexts, fundamentals of negotiation, common hurdles in negotiation and how to overcome them

.**Text Books:**

1. "Active Listening 101: How to Turn Down Your Volume to Turn Up Your Communication Skills, by Emilia Hardman, 2012
2. The Power of Communication: Skills to Build Trust, Inspire Loyalty, and Lead Effectively, by Helio Fred Garcia, 2012

ReferenceBooks:

1. Power Listening: Mastering the Most Critical Business Skill of All, by Bernard T. Ferrari, 2012
2. Fitly Spoken: Developing Effective Communication and Social Skills, by Greg S. Baker, 2011
3. The Secrets of Successful Communication: A Simple Guide to Effective Encounters in Business (Big Brain vs. Little Brain Communication), by Kevin T. McCartney, 2011.

Course Outcome

- In the end of the course, students will be able to channelize areas of communication in which they need to improve and use communication more effectively to get their messages across to people more clearly.

Syllabus
Semester – II

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-201: English -II

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To teach students in English Grammar and make them proficient in usage of grammar.

Unit I: Comprehension (Can be taken any passage and identify the below points)

- Comprehension passage 1
- Comprehension passage 2
- Comprehension passage 3
- Comprehension passage 4
- Comprehension passage 5

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit II: Short Paragraph Writing

- Topic 1 - Punctuality
- Topic 2 - Nutrition
- Topic 3 - Exercise
- Topic 4 - Global Warming
- Topic 5 – Disciple Inflation
- Topic 6 - Demonetization

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit III: Review writing

Topic 1 – Book [can be a story review for average students]

Topic 2 - Movie review [different kinds of movies can be suggested too for practice]

Topic 3 – Another Movie review

Topic 4 – Hotel / Café / Recreations centre Review

Topic 5 – Electronic Gadget Review (Laptop/smart phone / speakers/ PSP/ etc.)

What is a review? How to write a review. Different types of reviews.

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit IV: Writing for Social Media

- Writing for social media: Face book, Linked-in
- Points to remember while writing on the social media. How to write Profile summary.
- What is a blog? How to write a blog?

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit V: Presentations

- Formal Informal
- Debate
- Discussions
- Pick & Speak

Points to cover: Vocabulary, grammar, Construction of sentences.

Miscellaneous

Usage of Phrases & Idioms

Revision of English I & II

Text Books:

1. Practical English Usage by Michel Swan, Oxford University Press
2. Cambridge Grammar for English: A comprehensive Guide for spoken & written English (South Asian edition), Cambridge University Press

Reference Book:

1. How English Works by Michael Swan & Catherine Walter, Oxford University.

Course Outcome:

The students will have better understanding of usage of English Grammar in written communication.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI- 202: Linux Shell Scripting

L=3, T=0, P=0, C=3 **MM 100**

Course Objectives

- The course provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide.
- This unit provides examples to help the learners get a better understanding of the Linux system. The unit also provides the guidelines for the learners to take up vendor certifications.
- The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting.

Unit 1: Introduction to UNIX:

History of UNIX - Unix Components/Architecture - Features of Unix – UNIX Environment and UNIX Structure - Posix and Single Unix specification - The login prompt - UNIX commands – Basic commands - echo, printf, ls, who, date,passwd, cal - Combining commands - Internal and external commands – type, man , more and other commands - theuser terminal, displaying its characteristics and setting characteristics - The root login - super user: sucommand - /etc/passwd and /etc/shadow files - Commands to add, modify and delete users.

Unit II: UNIX file system:

UNIX File basics - File types and Categories – File Organization – Directories - home directory and the HOME variable - Reaching required files- the PATH variable - Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent parent directories - File related commands – cat, mv, rm, cp, wc - File inodes and the inode structure. File links – hard and soft links – Head and tail commands - Cut and paste commands - The sort command - Special files /dev/null and /dev/tty - File attributes and permissions - The umask and default file permissions - ls command - Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions

Unit III: UNIX Process Management:

The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.

Unit IV: Vi Editor:

Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg.

Unit V: Shell programming:

Introduction – Need for Scripts – Creating and Calling the Script – The Shebang – Different ways of running a script - Using variables in Script – Reading Input – Integer Variables – Arithmetic Expressions – Read-only variables – Exporting variables – Arrays - Control Statements: If, Then, Else, While and Until, Classic For, Break and Continue, Case – Handling Script Parameters: Shift, Getopts – Shell Functions – Handling Conditional expression patterns and Regular expressions in scripts.

Text Books:

1. Sumitabha Das., UNIX Concepts and Applications. 4th Edition. Tata McGraw Hill, July 2017.
2. Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming- Cengage Learning – India Edition. 2009

Reference Books :

1. M.G. Venkatesh Murthy: UNIX & Shell Programming, Pearson Education.
2. Richard Blum, Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2 ndEdition , Wiley,2014.

Course Outcomes

Students can,

1. To enable the students to have a hands on practical exposure to the Linux Red Hat Enterprise and make them prepared for the RHCE Certification.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-203: Object Oriented Programming Using Java

L=2, T=0, P=0, C=2 **MM 100**

Course Objective*:*

- Object oriented programming is the most proven technique for developing reliable programs. It helps in increased productivity, reusability of code, decrease in the development time, and reduces cost of production to an extent.
- The cost of maintaining such systems have also considerably decreased. There are many languages which used the object oriented concepts and techniques. Some of them are C++, Java, Smalltalk, Objective-C, etc.
- Java is a purely object oriented language. Systems/applications created using java programming language reduces the need for developing and maintain complex and space consuming applications. Java has a lot of advantages of being simple, robust, platform independent, etc. Nowadays java is also found in the mobile phones.

Unit I: Introduction

History and Overview of Java, Object Oriented Programming, Control statements- if and for loop. Using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words, Data types - Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting. Automatic type promotion in Expressions Arrays. Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements.

Unit II: Classes

Class Fundamentals, Declaring objects, Assigning object reference variables. Methods - constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods. Using objects as parameters, Argument passing, Returning objects. Recursion, Access control, Introducing final, understanding static. Introducing Nested and Inner classes. Using command line arguments. Inheritance – Basics, Using super, method overriding, and Dynamic method Dispatch, Using abstract classes and final with Inheritance.

Unit III: Packages

Definition. Access protection importing packages. Interfaces: Definition and implementation. Exception Handling – Fundamentals, types, Using try and catch and Multiple catch clauses, Nested try Statements, throw, throws, finally. Java’s built-in exception, using Exceptions.

Unit IV: Multithreaded Programming:

Java thread model – main thread, creating single and multiple thread. Is alive ( ) and join ( ). Thread – Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi-threading. I / O basics – Reading control input, writing control output, Reading and Writing files. Applet Fundamentals – AWT package, AWT Event handling concepts, the transient and volatile modifiers. Using instance of using assert.

Unit V: JAVA Database Connectivity (JDBC)

Database connectivity – JDBC architecture and Drivers. JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements, handling SQL exceptions. Accessing result sets: types and methods. An example - JDBC application to query a database.
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Text Books:

1. The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

Course Outcome:

- Read and understand Java-based software code of medium-to-high complexity.
- Use standard and third party Java's API's when writing applications.
- Understand the basic principles of creating Java applications with graphical user interface (GUI).
- Understand the fundamental concepts of computer science: structure of the computational process, algorithms and complexity of computation.
- Understand the basic approaches to the design of software applications.
- Apply the above to design, implement, appropriately document and test a Java application of medium complexity, consisting of multiple classes

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-204: Operating System

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs.
- Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.
- This course covers the concept of operating system and its applications

Unit I: Introduction to Operating System

Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

Unit II: Process Management

Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. **Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit III: Storage Management

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. **Virtual Management**: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation **File-System Interface**: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics.

Unit IV: **File-System Implementation**:

File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery **Disk Managemen**t: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

Unit V: Protection and Security

Protection: Goals of Protection, Domain of Protection, Access Matrix, and Implementation of Access Matrix, Revocation of Access Rights, Capability- Based Systems, and Language – Based Protection. **Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

Text Books:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System,6thEdition,WSE (WILEY Publication)

Reference Books:

1. William Stallings, Operating System, 4th Edition, Pearson Education.
2. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
3. Nutt: Operating Systems, 3/e Pearson Education 2004.

Course Outcome:

- After learning the fundamental concepts in Operating system including how OS has evolved over the years and different components of OS, students will continue to more significant functions of OS like Process management, storage and memory management etc.
- This will provide the necessary information for students to extract maximum benefits out of the OS while developing programs, working with applications and etc.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-205: Data Structure Using C

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- A data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently.
- Different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks.
- This course covers the basic concepts of different data structures which are the basic building blocks of Programming and problem solving.

Unit I: Introduction to Data structures

Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

Unit II: Searching and Sorting

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort.

Unit III: Stack and Queue

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, Operations on all types of Queues.

Unit IV: Linked List

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

Unit V: Tree Graphs and their Applications:

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.

Text Book

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'

Reference Books:

1. Trembley and Sorenson Data Structures
2. E. Balaguruswamy Programming in ANSI C.
3. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
4. Tenenbaum, Data Structures Using C. Pearson Education, 200
5. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
6. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
7. Langsam, AusensteinMaoshe& M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

Course Outcome:

- Students will benefit from the knowledge of Data Structures and different operating one can perform on these like searching, sorting, stacking and etc.
- This forms a very strong foundation for programming in different languages that the students will take up in subsequent semesters or in any other course.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-206: Environmental Studies

L=3, T=0, P=0, C=3 **MM 100**

Unit I: Introduction and natural resources: Multidisciplinary nature and public awareness, renewable and non-renewable resources and associated problems, forest, water, mineral, food, energy and land resources. Introduction to natural resources, conservation of natural resources and human role.

Unit II: Ecosystem: Ecological concepts, concept of ecosystems, types of ecosystems, ecosystem structure and functioning, energy flow, food chains and food webs, ecological pyramids.

Unit III: Biodiversity and Conservation: Definition, genetic species and ecosystem diversity biogeographically, classification of Indian value of biodiversity at national and local levels, India as a mega-diversity nation, treats to biodiversity and endangered and endemic species of India, need for conservation of biodiversity.

Unit IV: Environmental pollution: Definition , causes, effect and control of air pollution , water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, electromagnetic pollution, nuclear hazards , human role in prevention of pollution, solid waste management, disaster management, floods , earthquake, cyclone, and landslide
Firework Safety: Combustion of firework and pollution (noise, smoke, fireworks fallout and residue pollution), heavy metal toxicity due to fireworks and associated health effects.

Unit V: Social Issue and Environment: Unsuitable to suitable development, urban problem related to energy and water conservation, environment protection act, wild life protection act, forest conservation act, environmental issues, population explosion, and family welfare programme. Environmental and human health HIV, women and child welfare, role of information technology on environment and human health.
Corruption: definition and reasons, details of organizations/agencies working against corruption, role of individual against corruption and mode of action.

Ethics: Meaning, nature, determinants and objectives of ethics, ethics and its relation to values norms and morals, Indian ethos, Swami Vivekananda and ethics.

Text/Reference Books

1. Fundamentals of Environmental Biology, K. C. Agrawal, Nidhi Publishers (Bikaner).
2. Fundamentals of Ecology, E.P. Odum, W.B. Saunders Co. (USA).
3. Fundamentals of Ecology, E. P. Odum, Natraj Publisher (Dehradun).
4. Ecology: Principles and Applications, J. L. Chapman & , M. J. Reiss, Cambridge University Press.
5. Atmospheric pollution, W. Buch , Tata McGraw Hill(TMH)
6. Professional Ethics and Human Values, M. Govindarajan, PHI Learning Private Limited (Delhi).
7. Corruption and Reform in India, Jennifer Bussell , Cambridge University Press.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-207: Data Structures using C Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

Part A

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.
6. Sort N numbers using merge sort.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-208: Linux Shell Scripting Lab

L=0, T=0, P=2, C=1 **MM 100**

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.
9. Write a shell script to print end of a Glossary file in reverse order using Array.
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.
13. Write a shell script to reverse a given integer.
14. Write a shell script to list the files arranged in descending order of their size.
15. Write a shell script to check whether the given string is palindrome or not.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-209: Object Oriented Programming Using Java Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

Part A

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1t000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Part B

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number f lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a textfileld that allows only numeric value and in specified length.
5. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

Semester II **BCA (Common for CTIS, DS, UI/UX and IPA)**

BCAI-210: Personality Development

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To enhance and sharpen the various skills related to Personality Development and also make students aware of how to make use of these skills more effectively in team building and resolving conflicts both in personal and professional life.

Unit I: Personality & Self Esteem

Self-Management: discover yourself, skills and abilities, evaluate inner self, and expand your awareness, introspection, self- assessment, self-appraisal, self- development, self-interrogation, symptoms of negative attitude, anger management and positive attitude.
Definition of personality, Components of Personality, common personality types, Definition of Self Esteem, Factors related to self-esteem, SWOT analysis, Building Self Esteem, Definition of Attitude

Unit II: Interpersonal Skills & Working In team

What are interpersonal skills? Importance of Interpersonal Skills in the Business world, How to build relationships, approaches to team building, difference between a team and a group, kinds of teams, What is a team, Significance of working in team, Qualities required to be an effective Team Member, Skills required to build an effective TEAM, practice activities for team building
Leadership Skills: Leadership traits and trends, leadership in business , dynamics between Leadership and management, Leadership styles in India, analysing leadership theories in the context of globalisation and leadership abroad, leaders for new organizations, different styles of Leadership

Unit III: Time Management & Planning

Time as a resource, individual understanding of time, Effective time management Techniques, identifying time waster, achieving goals through effective time management, Time management Matrix – practice, multitasking, delegating, saying no assertively, relationship between time and stress management
Goal setting: concept of setting SMART goals, steps to achieve goals, career goals/ anticipating career challenges, utilizing opportunities, mapping skills sets

Unit IV: Problem Solving & Decision Making

What is a problem? Different stages of resolving a problem, Different factors that influence decision making, Different stages of decision making.

Unit V: Conflict and stress Management

What is a conflict?, Consequences of Conflict – Good & Bad, main sources of Conflict, Techniques to handle conflicts – Lose – win, Lose- Lose, Win – Lose, WIN- WIN; Role plays to practice conflict management, maintaining a positive attitude
Stress Management: stress and its causes, handling stress, types of stress, managing stress through motivation, relaxation techniques.

Text Book:

1. How to win friends and influence people by Dale Carnegie, Ebury Publication, 2004
2. 7 habits of highly effective people by Stephen. R. Covey, Simon And Schuster, 2004
3. The Monk who Sold his Ferrari by Robin.S.Sharma, Jaico, 2003

Reference Books:

1. The Tipping Point: How little things can make a big difference- Malcolm Gladwell, little brown book group, 2004
2. How to stop worrying and start living- Dale Carnegie, Random House, 2003

Course Outcome:

After completion of the course the student will be able:

- Students will develop knowledge and skills required to take up vendor certifications in the networking domain.

Syllabus
Semester – III

Semester III **BCA (Specialization in CTIS)**

BCAI-301: DBMS

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- A database management system (DBMS) is collection of software meant to manage a Database. Many popular databases currently in use are based on the relational database model.
- RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more.
- The course covers the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries. Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

Unit I: Introduction

Purpose of Database System -– Views of data – Data Models – Database Languages — Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases

Unit II: Relational Model

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals, Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables, Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL.

Unit III: SQL

Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User, Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

Unit IV: Database Design

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

Unit V: Transactions

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock-Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

Text Book:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006.

2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/Addision Wesley, 2007.

Reference Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006
2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/Addision Wesley, 2007.
3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2003.

Course Outcome

- Understand the Purpose of Database System
- Understand the relational model
- Describe Integrity Constraints
- Describe SQL fundamentals
- Understand Functional Dependencies
- Describe the concepts of transaction
- Understand ACID properties

Semester III **BCA (Specialization in CTIS)**

BCAI- 302: Computer Networks

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To understand the basics of networking and its underlying principles. This course enables learners to understand computer networking concepts, how they work, operate, communicate with ports and Protocols. Standards and models associated with networking technology and their troubleshooting mechanisms.

Unit I: Networking Fundamentals

Basics of Network & Networking, Advantages of Networking, Types of Networks, Types of Network Architecture, Workgroup vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling, media connectors, Introduction of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, Comparison between OSI model & TCP/IP model.

Unit II: Basics of Network Devices

Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, Modem, Ethernet standards, Ethernet Components, Point-to-Point Protocol, Address Resolution Protocol, Message format, transactions, Benefits of Wireless Technology, Types of Wireless Networks, Wireless network Components, wireless LAN standards, wireless security Protocols.

Unit III: Basics of Network, Transport and Application Layers

Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 and IPv6 Datagram Format, IPv4 addressing, IPv4 Subnetting, CIDR and VLSM, IPv6 Addressing, , Internet Control Message Protocol , Internet Group Management Protocol ,Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer Protocols

Unit IV: WAN Technology

Introduction to WAN, WAN Switching techniques, connecting to the Internet, Satellite-Based Services, Cellular Technologies, Technologies used for Connecting LANs, Remote Access Connections and technologies, Authentication and Authorization, Tunnelling and Encryption Protocols, Security Appliances and Security Threats.

Unit V: Troubleshooting Network

Trouble Shooting Networks: Command-Line Interface Tools, Network and Internet Troubleshooting, Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.

Text Book:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013

Reference Books:

1. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
2. CCNA Exploration Course Booklet: Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

Course Outcome:
After completion of the course the student will be able to:

- Explain the types of Network and its architecture
- Identify the function of each layer in OSI and TCP/IP Models
- Describe the Ethernet and wireless standards
- Discuss the functionality of Networking devices
- Demonstrate the IPv4 and IPv6 addressing types
- List the WAN Technologies
- Practice Network troubleshooting.

Semester III **BCA (Specialization in CTIS)**

BCAICT-301: Information Security

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To help students understand foundational concepts of information security
- To make it possible for students to appreciate the need for securing information from threats and risks
- To facilitate students to gain knowledge on how network infrastructure and connectivity can be secured

Unit I: Introduction

Security Definition, Why Security, Security and its need, Current Trends and Statistics, Basic Terminology, The C I A of Security the Relation: Security functionality and Ease of Use Triangle

Unit II: User Identity and Access Management

User identity and Access Management: Authentication, Account Authorization, Validation, Access Control and Privilege management. Hashing and Cryptography- Encryption and Decryption

.

Unit III: System and Server Security

System Security, Desktop & Server Security, Firewalls, Password cracking Techniques, Key-logger, viruses and worms, Malwares & Spy wares, Windows Registry

Unit IV: Internet Security

Internet Security: LAN Security, Email Security, Hacking attacks, preventive measures.

Unit V: Risk Assessment and Cyber Laws

Vulnerability Assessment, Penetration Testing**,** Risk Assessment, Threat, Vulnerability, Cyber Laws – Indian Context

Text Book:

1. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010
2. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – 2009 by Deven N. Shah, Wiley (2009)
3. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
4. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)
5. Cyber Security by Nina Godbole, SunitBelapure, Wiley, 2011

Reference Books:

1. Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015)
2. Information Security Management Handbook, Volume 4 - Micki Krause, ISC2 Press,

Couse Outcome:

- To enable students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures
- Apply their understanding of Information security in identifying common issues and propose suitable solutions
- Describe various algorithms and processes used in cryptography for authenticating users, securing information and communication

Semester III **BCA (Specialization in CTIS)**

BCAICT-302: Principles of Virtualization

L=2, T=0, P=0, C=2 **MM 100**

Course Objective*:*

1. To understand the virtualization and Cloud Technology
2. Implementing Virtualization using Hypervisors
3. To understand the vSphere components and its features.
4. Understanding and implementing the Storage Virtualization
5. Implementing Network virtualization using VMware NSX
6. How to Secure the ESXi and vCenter Servers
7. Monitoring the performance of resources used in SDDC

Unit I: Introduction

Introduction to Virtualization - Types of virtualization - Difference between cloud and virtualization - Physical infrastructure and virtual infrastructure - Virtualization approaches - Partitioning - Hosting - Isolation - Hardware independence - Virtual machine - Hypervisor - Types of hypervisor - Virtual machine manager - Types of hypervisor - Introduction to datacenter virtualization Esxi - Difference between Esxi and Esx - Versions of Esxi - Installation and configuration of Esxi 6.0 - vSphere 6.0

Unit II: Components of vSphere 6.0

Components of VMware vSphere - vSphere 6.0: Overview and Architecture - Topology of vSphere 6.0 Data Center - vSphere 6.0 Configuration MaximumsvCenter Server - vCenter Server Features - Certificate Management - Alarms and Alerts - Monitoring Features - Template Management - Linked Mode Deployment - Storage Features in vSphere - Shared Storage - Storage Protocols - Datastores - Virtual SAN - Virtual Volumes - Networking Features in vSphere - Virtual Networking - Virtual Switches and its types

Unit III: Features of vSphere and NSX

vSphere Resource Management Features - vMotion - Distributed Resource Scheduler (DRS) - - Distributed Power Management (DPM) - Storage vMotion - Storage DRS - Storage I/O Control - Network I/O Control - vSphere Availability Features - vSphere Data Protection - High Availability - Fault Tolerance - vSphere Replication - Introduction to NSX.

Unit VI: VSphere Solutions to Data Center Challenges and vSphere Security

Challenges - Availability Challenges - Scalability Challenges - Management Challenges - Optimization Challenges - Application Upgrade Challenges - Cloud Challenges - Security - Describe the features and benefits of VMware Platform Services Controller - Configure ESXi host access and authorization - Secure ESXi - vCenter Server - and virtual machines - Upgrade ESXi and vCenter Server instances

Unit V: Resource optimization and resource management

Network Optimization - Configure and manage vSphere distributed switches - Migrate virtual machines from standard switches to distributed switches - Explain distributed switch features such as port mirroring - LACP - QoS tagging - and NetFlow - CPU Optimization - Explain

the CPU scheduler operation - NUMA support - and other features that affect CPU performance - Monitor key CPU performance metrics - Memory Optimization - Explain ballooning - memory compression - and host swapping techniques for memory reclamation when memory is overcommitted - Monitor key memory performance metrics - Storage Optimization - Diagnose storage access problems - Configure VMware vSphere Flash Read Cache - Monitor key storage performance metrics

Text Books:

1. Virtualization Essentials Paperback – 26 Apr 2012 by Matthew Portnoy - wiley publications
2. VMware Cookbook Paperback – 17 Jul 2012 by Troy - Shroff/O'Reilly; Second edition (17 July 2012).

Reference Book:

1. Mastering VMware vSphere 5.5 (SYBEX) Paperback – 2014 by Scott Lowe, Nick Marshall, Forbes Guthrie, Matt Liebowitz , Josh Atwell - Wiley (2014) edition.

Course Outcome:

They should be able to

- Installing and configuring the SDDC using VMware products.
- Implementing Fault tolerance and High availability for the Virtual machines
- Securing the Virtual environment.
- Resource Optimization and monitoring.

Semester III **BCA (Specialization in CTIS)**

BCAICT-303: Cloud Computing

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To provide students with the fundamentals and essentials of Cloud Computing.
- To provide students a sound foundation of the Cloud computing so that they are able to identify the vendors and assess the risk involved in cloud migration.
- To enable students be aware of the various governance issues in cloud and how to manage the same.

Unit I: Fundamentals of Cloud Computing

Cloud Computing Basics – History of Cloud Computing, Characteristics of Cloud Computing, Need for Cloud computing, Advantages and Possible Disadvantages of cloud computing, Cloud Deployment Models – Public, Private, Hybrid, Community, Other deployment Models. Evolving Data Center into Private Cloud, Datacenter Components, Extracting Business value in Cloud Computing – Cloud Security, Cloud Scalability, Time to Market, Distribution over the Internet, Cloud Computing Case Studies.

Unit II: Cloud Delivery Models

Introduction to Cloud Services, **Infrastructure as a Service (IaaS)** – Overview, Virtualization, Container, Pricing Models, Service Level Agreements, Migrating to the Cloud, IaaS Networking options, Virtual Private Cloud(VPC), IaaS Storage – File and Object storage, Data Protection, IaaS security, Benefits, Risks and Examples of IaaS. **Platform as a Service (PaaS)** – Overview, IaaSvsPaaS, PaaS Examples, benefits and risks. **Software as a Service (SaaS)** – Introducing SaaS, SaaS Examples – Office 365, Google G Suite, Salesforce.com , Evaluating SaaS – user and vendor perspective, Impact of SaaS, Benefits and risks of SaaS. **Other Services on Cloud**, **Cloud Delivery Models Considerations**

Unit III: Cloud Platforms

Introducing Cloud Platforms, Evaluating cloud platforms, Cloud Platform technologies – Amazon Web Services, Microsoft Azure, Google Cloud Platform, Salesforce.com, and Impact of Cloud platforms. Private Cloud Platforms – Introducing Private clouds – Microsoft Azure stack, Open stack, AWS Greengrass, Impact of Private clouds

Cloud Migration : Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

Unit IV: Cloud Computing - Challenges, Risk and Mitigation

Cloud Storage, Application performance, Data Integration, Security. **Ensuring Successful Cloud Adoption**: Designing a Cloud Proof of Concept, Vendor roles and capabilities, moving to the Cloud. Impact of Cloud on IT Service Management.

Risks and Consequences of Cloud Computing – Legal Issues, Compliance Issues, Privacy and Security.

Unit V: Managing the Cloud

Managing and Securing Cloud Services, Virtualization and the Cloud, Managing Desktops and devices on the cloud, SOA and Cloud computing, Managing the Cloud environment, Planning for the Cloud – Economic Cost Model and Leveraging the Cloud, Cloud computing resources, Cloud Dos and Don'ts.

Text Books:

1. Kirk Hausman, Susan L. Cook, TelmoSampaio, " CLOUD ESSENTIALS CompTIA® Authorized Courseware for Exam CLO-001", John Wiley & Sons Inc., 2013
2. Judith Hurwitz , Robin Bloor , Marcia Kaufman , Fern Halper, "Cloud Computing for Dummies", Wiley Publishing Inc., 2010

Reference Books:

1. Erl," Cloud Computing: Concepts, Technology & Architecture", Pearson Education, 2014
2. Srinivasan, "Cloud Computing: A Practical Approach for Learning and Implementation "Pearson Education, 2014

Course Outcome:

- Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
- Analyze the risks involved in migrating the existing infrastructure to cloud.
- Assess various cloud service providers and generate effective cloud infrastructure by optimizing the cost involved.
- Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

Elective –I
BCAICT-304: Server Administration

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To recognize and explore various services provided the windows server 2012
- To analyze and apply centralized services with client nodes of the network
- To recognize the importance of active directory and dynamic access control services while applying the same in the server network infrastructure
- To justify the minimal management and attain improved performance with Hyper v client.

Unit I: Installing and Configuring Windows Server 2012

Introduction, Selecting a Windows Server 2012 Edition, Supporting Server Roles and Features, Server Licensing, Installing Windows Server 2012: System Requirement, Performing a Clean Installation, Working with Installation Partitions, Server Core Defaults, Server Core Capabilities, Completing Post-Installation Tasks, Converting Between GUI and Server Core, Upgrade paths, Installing Windows Server Migration Tools, Configuring NIC Teaming, Configuring local storage, Configuring WDS to install OS through networking.

Unit II: Securing Files and Disks.

How to Securing Files, Encryption files with EFS, Configuring EFS, Using the Cipher Command, Sharing Files Protected with EFS with others, Configuring EFS with Group Policies, Configuring EFS Recovery Agent, Managing EFS Certificates, Encrypting Files with BitLocker, Configuring BitLocker Encryption, configuring BitLocker to Go, Configuring BitLocker Policies, Managing BitLocker Certificates.

Unit III: Configuring File and Share Access Permissions

Designing a File-Sharing Strategy, Arranging Shares, Controlling Access, Mapping Drives, Creating Folder Shares, Assigning Permissions, Understanding the windows Permission Architecture and Basic, Advanced Permissions, Allowing and Denying Permissions, Inheriting

Permissions, Understanding Effective Access, Setting Share Permissions, Understanding NTFS Authorization, Assigning Basic NTFS Permissions, Understanding Resource Ownership, Combining Share and NTFS Permissions, Installing File Server Resource Manager, Using, creating, changing Quotas, Managing Files with File Screening, Creating File Groups, Creating a File Screen, Creating a File Screen Exception, Creating a File screen Template. Storage Reports Management.

Unit VI: Configuring DNS Zones and Records

Understanding DNS, Understanding DNS Names and Zones, Understanding the Address Resolution Mechanism, configuring and Managing DNS Zones, Installing DNS, Configuring Primary and Secondary Zones, Configuring Active Directory-Integrated Zones, configuring

Zone Delegation, configuring Stub Zones, configuring Caching-Only Servers, Configuring Forwarding and Conditional Forwarding, Configuring DNS Record types, creating and Configuring DNS Resource Records, Start of Authority(SOA) Records, Name Server(NS) Records, Host(A and AAAA) Records, Canonical Name(CNAME) Records, Pointer(PTR) Records..

Unit V: Implementing Patch Management and Monitoring Server Performance

Understanding windows Updates and Automatic Updates, Deploying Windows Server Update Services(WSUS), How to Install and Configure WSUS, Configuring WSUS Synchronization, Configuring WSUS Computer Groups, Configuring Group Policies for Updates, Configuring Client-Side Targeting, Approving Updates, Viewing Reports, Administrating WSUS with Commands, Troubleshooting Problems with Installing Updates.Introducing the Microsoft Management Console(MMC), Server Manager, Event Viewer, Understanding Logs and Events, Adding and Filtering Events, Managing Performance, Task Manager, Resource Monitor, Configuring Data Collector Sets (DCS), Monitoring the Network using Netstat and protocol analyzers.

Text Books:

1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. Administering Windows Server 2012 (Certification Guide) by Orin Thomas

Reference Book:

1. Administering Widows Server 2012 by Patrick Regan
2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, and Robert Butler.

Course Outcomes

- Recognize the various services of Server 2012
- Configuration of Active directory and manage the domains
- Administrate and manage the AD domains in server 2012
- Maintain and manage the group policies.

Semester III **BCA (Specialization in CTIS)**

Elective-I
BCAICT-305: Linux Administration

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- RHEL is a high performing operating system that. RHEL 6 is the sixth generation of the long term and predictable operating platform.
- With the flexibility to deploy on physical hardware, as a virtual host, as a virtual guest or in the cloud, Red hat Enterprise Linux 6 is the ideal foundation for next-generation datacenters.
- The fresh system administrators need to have a strong functional knowledge of RHEL 6 in any current IT work environment. The unit explores the security and network access controls in Linux, organizing network system and Mail Services, Securing Data and Account Management.

Unit I: Introduction to Linux

Introduction to Operating system - Types of Operating system - Multi user operating system - Open source licensing - History of Linux - Unix Vs Linux - Flavors of Linux - Benefits and characteristics of Linux - Installation of Linux - Linux booting process - Log in and switch users in multiuser run levels - Shell and bash features - Linux kernel - sudovssu - Date and time configuration – Linux run levels.

Directories and files:

Directory structure - System directory - Absolute path and relative path -Creating and removing directory - Changing directory path - Creating - removing - copying and moving files - File Permissions - Links – hard link and soft link - Input and output redirection - Filters and pipes - Locate - read - and use system documentation including man page

Unit II: Package, User and group Management

RPM - YUM - Archive - Compress - unpack and uncompress files using tar - star - gzip - and bzip2 - Create - delete - and modify local user accounts - Change passwords for local user accounts - Create - delete - and modify local groups and group memberships - Changing owner and modes.

Unit III: Configuring local storage and filesystem

List - create - delete - and partition type for primary - extended - and logical partitions - Create and remove physical volumes - assign physical volumes to volume groups - Create and delete logical Volumes. - Create - mount - unmount - ext2 - ext3 - and ext4 file systems. - Mount - unmount - and LUKS-encrypted file systems - Access control list.

Unit VI: Managing system and infrastructure services:

Managing system services - Shutting down - suspending and hibernating the system - Controlling systemd on remote machine - Creating and modifying systemd unit files – DHCP Configuration - HTTP server Configuration - FTP server Configuration - Mail server Configuration - Samba server Configuration - NTP server Configuration - NFS server Configuration

Unit V: OpenSSH and Linux security:

OPENSSH - The SSH Protocol - Configuring OpenSSH and Starting an OpenSSH Server Key-Based Authentication in OpenSSH - OpenSSH Clients - Using the ssh Utility - scp Utility and sftp Utility - Configure firewall settings using system-config-firewall or iptables - Set enforcing and permissive modes for SELinux - List and identify SELinux file and process context.

Text Books:

1. Orsaria, Jang, "RHCSA/RHCE Red Hat Linux Certification Study Guide Exams EX200 & EX300", McGraw-Hill Education, July 2017.

Reference Book:

1. Sander Van Vugt, "Red Hat RHCSA/RHCE 7 Cert Guide: Red Hat Enterprise Linux 7 (EX200 and EX300)", Phi Learning Pvt Ltd, 2009.

Course Outcome:

- Students will attain skills required to manage and administer systems and servers using Linux Operating System.
- The operating system used for this unit is Red hat Enterprise Linux 6 (RHEL 6).
- Students may also appear for RED HAT Certification exam in Linux Administration after the completion of this course.
    - Be able to start a highly scalable MySQL or Oracle database in the cloud with multiple read-replica databases (for scalability of database)
    - Be able to setup a load-balancer in the cloud.

Semester III **BCA (Specialization in CTIS)**

BCAI-303: DBMS Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

1. Perform following actions using SQL statements
    a. Create a new user with name “shiva” and password “kumar@1”
    b. Assign the following privileges
        i. Create and drop tables
        ii. Create and drop users
        iii. Allow to assign above privileges to new users
        iv. List all tables in the database
        v. List all users in the database
        vi. Logout from current user and log in as “shiva”
2. Create following tables and insert minimum 10 rows in to each table
    a. Department table with following columns with appropriate data types
        i. DeptId
        ii. DeptName
        iii. DeptLoc
    b. Employee table with following columns with appropriate data types
        i. EmpId
        ii. EmpName
        iii. DOB
        iv. DOJ
        v. Job
        vi. Salary
    c. Product table with following columns with appropriate data types
        i. ProdId
        ii. ProdName
        iii. Price
    d. Sales table with following columns with appropriate data types
        i. SalesId
        ii. Date
        iii. Quantity

3. Update above tables with following features using SQL statements
    a. Make DeptId in Department table as Primary Key
    b. Make EmpId in Employee table as Primary Key
    c. Add DeptId column to the Employee table and make it foreign key from Department table and update the values
    d. Add EmpId and ProdId to the Sales table and make them foreign key from Employee and Product table and update the values
    e. Update all columns in all tables with appropriate constraint such as not null, check and so on
4. Perform the following SQL statements
    a. Create a view "EmpDeptView" from Employee and Department table which contains following columns
        i. EmpName
        ii. DOB
        iii. Salary
        iv. DeptId
        v. DeptName
        vi. Loc
    b. Retrieve all employees whose salary between 25,000 to 30,000
    c. Retrieve all employees who is working in Accounts department (If it is not there add this row to Department table)
    d. Retrieve all employees who is working other than Accounts department
    e. Retrieve all employee who is working in Sales department and Bangalore location
    f. Retrieve all employees who completed minimum 5 years
    g. Retrieve all employees who completed minimum 5 years and salary less than 30,000
5. Perform the following SQL statements
    a. Retrieve all employees whose salary more than 30,000
    b. Retrieve employee details who is getting maximum salary
    c. Retrieve employee details who is getting minimum salary
    d. Retrieve employee details who is getting 3rd maximum salary
    e. Retrieve employee details who is getting 5th minimum salary
    f. Retrieve total number of employees in each department in Bangalore location

   g. Retrieve total number of employees in each location
   h. Retrieve total number of employees in each location in Accounts department
   i. Retrieve total number of employees who complete more than 10 years in each department
6. Write a PL/SQL Procedure to find prime number from 1 to n, n is a user input or parameter
7. Write a PL/SQL Functions to return number of days an employee working using EmpId
8. Write a PL/SQL Procedure to find sum of salaries of all employee working in a particular location
9. Write a PL/SQL Function to return sum of sales by ProdId
10. Write a PL/SQL Function to return sum of sales by EmpId
11. Write a PL/SQL Procedure to generate Employee Report department wise as follows:

    DeptName

    EmpName Job Location Salary Cumulative_Salary

12. Write a PL/SQL Trigger to insert row into OldEmployee table when a employee deleted from Employee table (Create OldEmployee table)
13. Write a PL/SQL Trigger not to delete more than 2 employees at a time
14. Write a PL/SQL Trigger not to update employee salary if it cross 67000
15. Write a PL/SQL Package with following procedures and functions
    a. Procedures
       i. Print Total Quantity Sales Summary Report(SalesId, Date, Quantity and Total Quantity)
       ii. Print Total Quantity Sales Summary Report by Date wise
    b. Functions
       i. Return employee name who made maximum sales till date
       ii. Return product name soled maximum quantity till date

Semester III **BCA (Specialization in CTIS)**

BCAICT-306: Principles of Virtualization Lab

L=0, T=0, P=2, C=1 **MM 100**

List of Experiments:

Hardware:

CPU: i3/i5
Network Card: 100Mbps/1Gbps
Memory: 8 GB
Storage: 256 GB/500GB

Software Requirements:

ESXi 5.5/6.0[Hypervisor]
vSphere Client
Google Chrome/ IE with Flash Player installed.

The infrastructure required to complete the lab exercises from Lab2 to Lab10 are as follows:

Windows 7/8/10
Internet Speed: 2Mbps
Web link for Online VMware Labs:

http://labs.hol.vmware.com/HOL/catalogs/catalog/681

Web link for HOL lab Manuals:

http://docs.hol.vmware.com/

S.NO	Name of Lab Exercise		
1	Installing and configuring ESXi 5.5/6.0 Server [On Premise]		
2	HOL-1810-01-SDC	Virtualization 101	Introduction to Management with vCenter Server Introduction to vSphere Networking And Security
3	HOL-1810-01-SDC	Virtualization 101	Introduction to vSphere Storage
4	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	vSAN 6.6 Setup and Enablement vSAN Scale Out with Configuration Assist vSAN All Flash Capabilities
5	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	vSANiSCSI Target vSAN Encryption

6	HOL-1808-01-HCI - vSAN v6.6 - Getting Started	vSAN v6.6 - Getting Started	vSANPowerCLI and ESXCLI vSAN Stretched Cluster
7	HOL-1803-01-NET - VMware NSX - Getting Started	VMware NSX	NSX Manager Installation and Configuration Logical Switching
8	HOL-1803-01-NET - VMware NSX - Getting Started	VMware NSX	Logical Routing Edge Services Gateway
9	HOL-1811-04-SDC - vSphere Security - Getting Started	vSphere Security	Automating Password Complexity for ESXi Users Forensic Security with vRealize Log Insight
10	HOL-1811-04-SDC - vSphere Security - Getting Started	vSphere Security	VM Encryption and Encrypted vMotion Secure Boot for Hosts and VMs No-Cryptography Administrator Roles and Permissions

Semester III **BCA (Specialization in CTIS)**

BCAI-304: Business Communication & Presentation Skills

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To train students in how to be effective communicators by practicing various skills and also help those in becoming well-groomed individuals in terms of both verbal and non-verbal communication.

Unit I:

Principles of Effective written communication

7 C's of Business communication: Clarity, Completeness, Conciseness, Consideration, Courtesy, Correctness, and Concreteness. Practice sessions for business writing.

Unit II:

Letter writing

Structure & Planning, Types of Letter: Leave letter, Cover Letter, Application Letter.
Persuasive Writing: AIDA; practice sessions on letter writing.

Unit III:

Email & Memo writing

Importance of Email & Memo writing in the business world, Format of Email & Memo, Structure of Email & Memo, practice sessions on email and memo writing

Unit IV:

Precise Writing & Report Writing

Techniques of Precise writing, qualities of a good precise.Different types of Report – sales report, Annual report, Technical report, Components of a good report focusing on how to write short reports, practice sessions on report writing

Unit V:

Resume writing

Components of a good resume, different formats of resume, resume writing practice

Conducting Effective Meetings

Different Types of meetings: Business meetings, Review meetings, Preparation for the meeting – Writing Agenda, MOM.

Presentation Skills

Planning & developing effective Presentation, Do's & don'ts of a good presentation, use of Effective visual aids in a presentation

Text Book:

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.
2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.

Reference Books:

1. Shirley Taylor, Communication for Business, Pearson Education.
2. Lesiicar and Flatley, Basic Business Communication, Tata McGraw-Hill.
3. Courtan L. Bovee et al., Business Communication Today, Pearson Education.
4. Meenakshi Raman & Prakash Singh, Business communication, Oxford University Press

Course Outcome*:*

- Students will be able to overcome nervousness and stage fear at the end of the course.

Semester III **BCA (Specialization in CTIS)**

BCAI-305: Summer Project Seminar I

L=0, T=0, P=2, C=1 **MM 100**

Course Objective*:*

The objective of Summer Project is to enable the student to take up investigative study in field of Computer application with emphasis on their specialization. This is expected to provide a good initiation for the student(s) in Industry practices. The students are expected to investigate, model and present their work either individually or in groups (to be decided by the department) to the departmental committee.

Syllabus
Semester – IV

Semester IV **BCA (Specialization in CTIS)**

BCAICT-401: Storage and Datacenter

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To impart the basic concepts of Storage systems and Datacenter environment.
- To understand concepts about RAID techniques.
- To understand basic concepts about NAS and SAN.
- To understanding about taking backup and restoring the data with the help of Business Continuity and Disaster Recovery concepts and tools.
- To understand about Data Center Consolidation and Clustering.

Unit I: Introduction to Storage System

Introduction to Information Storage: Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing

Data Center Environment: Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage, Host Access to Data, Direct-Attached Storage, Storage Design Based on Application

Data Protection (RAID): RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID Levels, RAID Impact on Disk Performance, RAID Comparison.

Unit II: Storage Networking Technologies

Network-Attached Storage: General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance , File-Level Virtualization.

Fibre Channel Storage Area Networks: Fibre Channel Overview, The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN.

IP SAN and FCoE: iSCSI, FCIP, FCoE

RAID and Storage Networking Technologies : Implementation of RAID - Software RAID - Hardware RAID -RAID Array Component -RAID Levels - Striping -Mirroring - RAID Impact on Disk-Performance - Introduction to Direct Attached Storage – Types of DAS – Introduction to SAN – Components of SAN – FC connectivity – FC topologies – Introduction to NAS – NAS components – NAS Implementation – NAS File sharing.

Unit III: Backup and Disaster Recovery

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions.

Backup and Archive: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture.

Unit IV: Data Center Consolidation

Reasons for Data Center Consolidation: Reasons for Data Center Consolidation, Consolidation Opportunities.

Data Center Consolidation Phases: Phase 1: Study and Document the Current Environment, Phase 2: Architect the Target Consolidated Environment, Phase 3: Implement the New Architecture, Phase 4: Control and Administer the Consolidated.

Best Practices in IT: Defining Best Practices, Deploying Best Practices, Benefits of Best Practices, Systems Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices, Network Diagram Documentation, Documentation Formats.

Unit V: Data Center Clusters

Cluster Architecture: Asymmetric Two-Node Clusters, Symmetric Two-Node Clusters, Complex Cluster Configurations, Failover Policies, Best Practices.

Cluster Requirements: Required Hardware Cluster Components, Cluster Software Requirements, What Happens During Service Failover, Cluster Installation Checklist.

Designing Cluster-Friendly Applications: Automating Operations, Controlling Application Failover Time, Reducing Data Loss During Failover, Minimizing Application Failures, Designing Node-Independent Applications, Minimizing Planned Downtime, Restoring Client Connections.

Text Books:

1. Information Storage and Management (Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments) 2nd Edition by Somasundaram Gnanasundaram Alok Shrivastava.
2. Administering Data Centers: Servers, Storage, and Voice over IP By KailashJayaswal ISBN-13: 978-0471771838.

Reference Books:

1. Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE by Ulf Troppens.
2. Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation by Volker Herminghaus and Albrecht Scriba.
3. Blade Servers and Virtualization: Transforming Enterprise Computing While Cutting Costs by Barb Goldworm and Anne Skamarock.

Course Outcome:
At the end of the course, students will be able to:

- Analyze Storage devices and technologies.
- Summarize the advantages and functionality of NAS and SAN.
- Appreciate knowledge on Backups and Disaster Recovery.
- Describe Data Center Consolidation and its phases.
- Appreciate knowledge on design and analysis of Cluster Architecture.

Semester IV **BCA (Specialization in CTIS)**

BCAI-401: Python Programming

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To setup the environment to run the python programs
- To understand concepts about Data Types and Looping techniques
- To understand and implement the OOP concepts, Decorators, and Iterators
- To understand and build the Web Applications
- Debugging and Troubleshooting Python Programs

Unit I:

Introduction to Python

Introduction: Introduction to Python, Setting up the environment, Installing Python, Running python program, Python's execution model, Guidelines on how to write good, The Python culture, A note on the IDEs.

Built-in Data Types: Numbers, Immutable sequences, Mutable sequences, Set types, Mapping types – dictionaries, The collections module, Final considerations

Iterating and Making Decisions: Conditional programming, Looping, Putting this all together.

Unit II: Advanced Concepts

Functions, the Building Blocks of Code: Use of functions, Scopes and name resolution, Input parameters, Return values, Recursive functions, Anonymous functions, Function attributes, Built-in functions, importing objects.

Saving Time and Memory: map, zip, and filter, Comprehensions, Generators, Some performance considerations, Name localization, and Generation behavior in built-ins.

Advanced Concepts – OOP, Decorators, and Iterators: Decorators, Class and object namespaces, Attribute shadowing, Initializing an instance, Accessing a base class, Multiple inheritance, Static and class methods, Private methods and name mangling, The property decorator, Operator overloading, Polymorphism

Unit III: Web Development

The Edges – GUIs and Scripts: Scripting-The imports, Parsing Arguments, The business logic, GUI application- The import, The layout logic, The business logic, The tkinter.tixmodule,The turtle module, wxPython, PyQt, and PyGTK, The principle of least astonishment, Threading considerations.

Web Development Done Right: Django design philosophy, The Django URL dispatcher, Setting up Django, Adding the Entry model, Customizing the admin panel, Creating the form,

Writing the views, Tying up URLs and views, Writing the templates, Writing a Flask view, Building a JSON quote server in Falcon.

Unit IV: Cloud Native Python

Building Microservices in Python: Modeling microservices, Building microservices, Testing the RESTful API.

Building a Web Application in Python: Getting started with applications, Working with Observables and AJAX, Binding data for the adduser template, Working on Observables with AJAX for the addtweet template, Data binding for the addtweet template, CORS - Cross-Origin Resource Sharing, Session management, Cookies.

Interacting Data Services: MongoDB terminology, Initializing the MongoDB database, Integrating microservices with MongoDB, Working with user resources, Working with the tweets resources.

Unit V: Exception Handling

Testing, Profiling, and Dealing with Exceptions: The anatomy of a test, Testing guidelines, Unit testing, Test-driven development, Exceptions, Profiling Python.

Debugging and Troubleshooting: Debugging with print, Debugging with a custom function, Inspecting the traceback, Using the Python debugger, Inspecting log files, Other techniques, Troubleshooting guidelines.

Text Books:

1. Learn Python Programming, 2nd Edition by Fabrizio Romano
2. Python Cookbook, 3rd Edition by David Beazley (Author), Brian K. Jones (Author)

Reference Books:

1. Python Programming: A Step-by-Step Guide For Absolute Beginners by Brian Jenkins and ATS Coding Academy
2. Python and AWS Cookbook: Managing Your Cloud with Python and Boto by Mitch Garnaat
3. Advanced Python Programming: Build high performance, concurrent, and multi-threaded apps with Python using proven design patterns by Dr. Gabriele Lanaro
4. Programming Google App Engine with Python: Build and Run Scalable Python Apps on Google's Infrastructure by Dan Sanderson

Course Outcome:

At the end of the course, students will be able to:

- Install and Run Python Program
- Write functions and Loops in the python program
- Implementing OOPs concepts while writing Python Program
- Developing web applications using Django
- Build micro services in Python
- Test, Debug and Troubleshoot Python Programs

Semester IV **BCA (Specialization in CTIS)**

BCAICT-402: Cloud Web Services

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- Introducing cloud computing and Amazon web services.
- Understanding and using EC2 instances.
- Deploying and managing applications on AWS cloud.
- Using AWS security services.
- Implementing the networking concepts on AWS cloud.

Unit I: Introduction to Cloud Computing and Amazon Web Services

Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid and Community), Cloud Computing Security, Case Study

Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation and Orchestration Options, AWS Systems Management and Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts

Unit II: Introduction to EC2

Introduction To EC2, Instance Types And Uses, Auto scaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Elastic IPS, Elastic Load Balancing

Unit III: Web Applications and Security

Introduction to Elastic Beanstalk, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation, Introduction to CloudWatch, Describe Amazon Cloud Watch metrics and alarms, AWS Messaging Services(SNS,SQS,SES).
Introduction to AWS Security, Describe Amazon Identity and Access Management (IAM), AWS Directory Service, AWS Key Management Service, Securing Data at Rest and In Motion,

Unit IV: AWS Storage

Amazon Storage, S3 Storage Basics, Buckets and Objects, Creating A Web Server Using S3 Endpoints, Managing Voluminous Information with EBS, Glacier Storage Service , Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance,

Unit V: AWS Networking

Introduction to AWS Networking , Access Control Lists (ACLs), Setting Up a Security Group, Setting Up VPC And Internet Gateway, Setting Up A VPN, Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1:VPC With A Public Subnet Only (Standalone Web), Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3:VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension Of Your Corporate Network), Route53 for DNS System, Cloud front, Case Study.

Text Book:

1. Joe Baron, Hisham Baz , Tim Bixler , Biff Gaut , Kevin E. Kelly , Sean Senior , John Stamper , "AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Wiley and Sons Publications, 2017

Reference Book:

1. Yohan Wadia , "AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Packt Publishing, 2016

2. Bernald Golden, "Amazon Web Services for Dummies", John Wiley & Sons, 2013

Course Outcome:

Students can:

- To gain fundamental understanding of AWS cloud technologies
- Be able to start a Windows or Linux server in the cloud with its own private address
- Be able to start up a CRM / Word Press / etc. website hosted in cloud
- Be able to start a highly scalable MySQL or Oracle database in the cloud with multiple read-replica databases (for scalability of database)
- Be able to setup a load-balancer in the cloud.

Semester IV **BCA (Specialization in CTIS)**

BCAICT-403: Ethical Hacking

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To help students understand how ethical hacking is used as a method to prevent hacking.
- To make it possible for students to learn the process of identifying vulnerabilities and exploits of the technological ecosystem comprising of various hardware, software, network, OS and applications and identify suitable countermeasures.
- To facilitate students, appreciate the need for understanding non-technology aspects of ethical hacking such as legal frameworks, documentation and report writing.

Unit I: Introduction to Ethical Hacking:

Hacking Methodology, Process of Malicious Hacking, and Foot printing and scanning: Foot printing, scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs. White Box Techniques.

Unit II: Hacking Methodology:

Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques.

Unit III: Web and Network Hacking

SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls.

Unit IV: Report writing & Mitigation

Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Unit V : Ethical Hacking and Legal System

Overview of India's Information Technology Amendment Act 2008 (IT Act 2008), hacker vs cracker, liabilities – civil and penal, cyber theft and IPC sec 378, IT Act 2008 – sections 43, 65 and 66, how to file a complaint of suspected hacking, Case Studies, understanding how hacking is legally dealt with among BRICS countries.

Text Books:

1. Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback – 1 Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017)

2. CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016).

3. Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017).

4. An Ethical Guide To WI-FI Hacking and Security by SwaroopYermalkar, BecomeShakespeare.com; First edition (15 August 2014).

5. Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | Kent Backman | James Corley, Cengage India 1st edition (2016).

Reference Books:

1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson, Syngress; 2 edition (12 September 2013).

2. Hacking With Python: The Complete Guide to Ethical Hacking, Basic Security, Botnet Attack, Python hacking and Penetration Testing Kindle Edition by John C. Smalls.

Course Outcome:

Students can,

- Explain the importance of ethical hacking in achieving the goals of information security.
- Differentiate the processes of vulnerability assessment and ethical hacking from penetration testing.
- Comprehend the importance of appropriate countermeasures for managing vulnerabilities
- Justify the need for meticulous documentation in writing reports for consumption of both technical and management audiences.
- Articulate the rationale for having an adequate legal framework for dealing with hacking and ethical hacking.

Semester IV **BCA (Specialization in CTIS)**

Elective-II

BCAICT-404: Network Security

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To help students understand various characteristics of network security, threats and risks to securing network
- To make it possible for students to learn important network security protocols and means of achieving an effective network security
- To facilitate students, gain hands-on experience of identifying and providing solutions for common network security challenges using various security tools and techniques.

Unit I: Introduction to Network Security

Perimeter Security – Overview of Network Security, Access Control, Device Security, Security features on Switches, Firewall, Types of firewall, Access Management, Multifactor Authentication, Wireless LAN (WLAN) Security and Network Admission Control (NAC)

Unit II: Threats, Vulnerabilities and Attacks

Threat; Vulnerabilities; Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks; Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements, Administering a Secure Network

Unit III: Network Security Management

Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI); Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN)

Unit VI: Network Security Controls

Network Intrusion Prevention – Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS high Availability; host Intrusion Prevention; Anomaly Detection and Mitigation.

Unit V: Network Management

Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies

Text Books:

1. Network Security Bible by Eric Cole, Wiley; Second edition (2009)
2. Network Security: Private Communication in a Public World by Charlie Kaufman, Radia Perlman, Mike Speciner, Pearson Education; Second edition (15 September 2016)

3. Network Security and Administration by Adesh K. Pandey, S.K. Kataria& Sons; Reprint 2013 edition (2013)
4. Network Security: A Beginners Guide by Eric Maiwald, McGraw Hill Education; Third edition (1 November 2012)
5. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)
6. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008.

Reference Book:

1. Network Security. Principles And Practice. Fifth Edition. William Stallings. Prentice Hall.
2. Cryptography and Network Security Principles and Practices, Fourth Edition. By William Stallings. Publisher: Prentice Hall
3. Network Security Assessment: Know Your Network by Chris McNab, Shroff/O'Reilly; Third edition (1 December 2017)
4. Hacking Exposed 7: Network Security Secrets and Solutions by Stuart Mcclure, Joel Scambray, George Kurtz, McGraw Hill Education; 7 edition (16 March 2012)
5. Applied Network Security Monitoring: Collection, Detection, and Analysis by Chris Sanders, Jason Smith, Syngress (20 January 2014)
6. The Network Security Test Lab: A Step–by–Step Guide by Michael Gregg, John Wiley & Sons (9 October 2015)

Course Outcome:

Students can,

- Relate fundamental concepts of information security with network and connectivity
- Apply their understanding of network security in identifying common issues and propose suitable solutions
- Articulate the importance of managing the network using policies, processes and framework for effective and efficient security

Semester IV **BCA (Specialization in CTIS)**

Elective-II
BCAICT-405: Database Security Fundamentals

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To help students relate concepts of information security with databases
- To make it possible for students to learn how important principles of Security are implemented in securing the database

Unit I: Concepts of Database Security Management System

Database security concept, Importance of data, Levels of data security, Authorization in databases, Issues in database security, Concept of Least Privilege in User ID for databases. Perimeter security, firewalls, intrusion detection, and intrusion prevention

Unit II: Concepts of NoSQL

No SQL databases introduction, Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs', Economics/Cost, Flexible Data models. Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability), BASE Properties, CAP theorem, comparison to traditional RDBMS databases. Horizontal scalability, Benefits of NoSQL Databases compared to traditional Databases.
Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases, Concept of Graph Databases, Concept of Multimodel Databases

Unit III: Encryption and Permissions in SQL Server 2012

Understanding permissions, Creating and using database roles, using schemas for security, configuring cross-database security. Code and Data Encryption- Using service and database master keys, creating and using symmetric and asymmetric keys, creating and storing hash values, Authenticating stored procedure by signature

Unit IV: Security of SQL Server 2012

User authorization, authentication and security, protecting data using permissions, roles, schemas, SQL firewall, web application firewall, securing dynamic SQL from injections, protecting SQL server from DoS and injection attacks.

Unit V: SQL Server Auditing

Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing, auditing and tracing user configurable events, policy based management, system centre advisor to analyze instances

Text Books:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
2. Database security by SilvanaCastano, 2nd Edition, Pub: Addison-Wesley Professional, 2008
3. Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKT publishing, 1st ed; 2012

Reference Books:

1. Handbook of database security: Applications and Trends Michael Gertz, SushilJajodia, Pub: Springer, 1st ed; 2008
2. Implementing database security and auditing, Ron Ben-Natan, Pub: Digital Press, 1st ed; 2005

Course Outcome:

- Explain how security is ensured in database
- Justify the need for securing database in mitigating important vulnerabilities.

Semester IV **BCA (Specialization in CTIS)**

BCAICT-406: Ethical Hacking Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

Hardware:

- I3/ I5 processor; 8GB RAM; 250GB HDD.

Software:

- VM Player; Windows server; Windows 7/ 10; Kali Linux; All-in-one keylogger; DELmE virus maker .

Experiments:

1. Perform network scan to revile active hosts, open ports and services running.
2. Perform privilege escalation attack on Client operating system and gain control of a Client operating system and write a short note on its mitigation strategy.
3. Demonstrate ARP Poisoning and detect ARP Poisoning in switch-based network.
4. Perform man-in-the-middle attack and hijack an established session of a user. Write a report on the same with mitigation strategy.
5. Crack FTP credentials using dictionary attack and write a report of possible suggestion on hardening the login services.
6. Perform user system surveillance and write a mitigation report on the same.
7. Exploiting NetBIOS vulnerability and password revelation from browsers and social networking application using Key Logger and Trojan.
8. Perform denial service attack on a server operating system and write a report on the same with mitigation strategy.

Semester IV **BCA (Specialization in CTIS)**

BCAI-402: Python Programming Lab

L=0, T=0, P=2, C=1 **MM 100**

1. Write a python code to find given number is prime or not
2. Write a python code to find LCM and GCM of a given list
3. Write a python code to find mean and standard deviation of a given list of numbers
4. Write a python code to add and delete element from a dictionary using functions
5. Write a python code to print 10 student details using class and lists
6. Write a python code to find student from a given list using class
7. Write a python code to inherit employee class to student class
8. Write a python code to build simple GUI calculator
9. Write a python code to build web page with student registration form
10. Write a python code to build web pages with sign-in and sing-up forms
11. Write a python code to build Rest API for product
12. Write a python code to build Ajax enabled web application for product

Semester IV **BCA (Specialization in CTIS)**

BCAICT-407: Cloud Web Services Lab

L=0, T=0, P=2, C=1 **MM 100**

1. Introduction to Amazon Simple Storage Service (S3)
2. Introduction to Amazon Cloud Front
3. Introduction to AWS Key Management Service
4. Introduction to Amazon Elastic search Service
5. Introduction to Amazon Dynamo DB
6. Introduction to Amazon API Gateway
7. Introduction to Amazon Redshift
8. Introduction to Amazon Aurora
9. Introduction to Amazon Machine Learning
10. Introduction to AWS Database Migration Service
11. Introduction to AWS Lambda
12. Introduction to AWS Internet-of-Things (IoT)
13. Introduction to AWS Device Farm
14. Introduction to Amazon Kinesis Firehose
15. Introduction to Amazon Route 53
16. Introduction to Amazon Elastic File System (EFS)

Semester IV **BCA (Specialization in CTIS)**

BCAI-403: Logical Reasoning and Thinking

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To help students learn the techniques of enhancing and sharpening their aptitude skills related to verbal ability, quantitative aptitude, logical reasoning and data presentation.

Unit I: Verbal ability

Synonyms**,** Antonyms and One word substitutes

Unit II: Basic quantitative aptitude

Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications.

Unit III: Logical Reasoning - I

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data

Unit IV: Measures of Central Tendency

Objective of averaging, characteristics of good average, types of average, arithmetic mean of grouped and ungrouped data, correcting incorrect values, weighted arithmetic mean
Median - median of grouped and ungrouped data merit and limitation of median, computation of quartile, decile and percentile
Mode - calculation of mode of grouped and ungrouped data, merits and limitation of mode, relationship between mean, median and mode. Geometric mean and Harmonic mean.

Unit V: Presentation of Data

Construction of tables with one or more factors of classification; Diagrammatic and Graphical representation of non-frequency data; Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Data Interpretation – Introduction and approaches

Text Books:

1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, NewDelhi, 5th Ed. 2007
2. Bajpai, N. Business Statistics, Pearson, 2010.

Reference Books:

1. Sharma J.K., Business Statistics, Pearson Education India, 2010.
2. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, West Publishing Company, 1996.
3. CAT Complete course, UPKAR publications.

Course Outcome:

- By the end of this course, students will be able to use their logical reasoning and thinking skills more effectively; hence making them ready to clear written aptitude tests in industries and get placed easily.

2, 02, 2021

To

The Dean

Faculty of Computer Application

Invertis University, Bareilly

Subject: Constitution of Programme Review Committee (PRC) for Implementing the Course Related Feedback Received from the Stakeholders.

Dear Sir,

A Programme Review Committee (PRC), of the Faculty of computer applications, has been constituted with the objective of implementing the course related feedback received from the stakeholders and thus giving a shape to the programme curricula. The aforementioned committee consists of the following members:

1. Mr. Jitendra Kumar Chaudhary
2. Mr. Saurabh Kumar
3. Mr. Kushal Johari

The responsibilities of the Programme Review Committee will be as follows:

- To implement the feedback received from the stakeholders of all the Academic Programmes.
- To give a shape to the curricula of all the academic programmes.
- To define PO, PSO and CO for the courses and programmes.
- To include in the programmes, courses of cross cutting issues like environment, human values & ethics, gender sensitisation, professional ethics, etc.
- To ensure that a significant proportion of the syllabi are modified to effectively respond to the changing needs of the environment, industry and profession.

Thanking you.

Yours sincerely,

Mr. Jitendra Kumar Chaudhary

HOD-FOCA

INVERTIS
UNIVERSITY BAREILLY
Established by Govt. of U.P. u/s 2F of UGC Act, 1956 vide U.P. Act 22 of 2010

Order: Departmental Course Review Committee

Dated: 10-02-2021

In order to maintain the quality and best outcome of the program the following Course review committee has been constituted for the departmental academic program review for session 2021-22.

Course Review Committee (CRC-Committee)

This Committee has been framed in the department with three faculty members:

a. **Mr. Amit Taneja (Committee Head)**

b. **Ms. Shivangi Ghildiyal (Member)**

c. **Ms. Archana Saxena (Member)**

Program Review Committee (PRC-Committee)

This Committee has been framed in the department with three faculty members:

1. **Mr. Jitendra Kumar Chaudhary**
2. **Mr. Saurabh Kumar**
3. **Mr. Kushal Johari**

Mr. Jitendra Kumar Chaudhary

Head, Department of Computer Applications

INVERTIS
UNIVERSITY BAREILLY
Established by Govt. of U.P. u/s 2F of UGC Act, 1956 vide U.P. Act 22 of 2010

Letter (CRC Work Status)

Dated: 14-02-2021

The Course review committee (CRC) 2021 of Computer Applications department successfully analyzed the complete data of feedbacks of all five stakeholders. All the data is compiled in presence of CRC members. Report is ready for transfer to PRC (Program review committee) of the Computer Applications department.

Ms. Shivangi Ghildiyal (Member)

Ms. Archana Saxena (Member)

Mr. Amit Taneja

(Committee Head)

INVERTIS
UNIVERSITY BAREILLY

Department of Computer Applications
Invertis University
MINUTES of MEETING of Pre-BOS

Organizer: Mr. Jitendra Kumar Chaudhary

Date: 15/02/2021
Time: 3:30 PM
Venue: Conference Hall (AB-III)

Organizer welcomed and briefed the committee members about the agenda. The agenda of the meeting was discussed as under:

1: To introduce new programs, the schemes of BCA (Cloud) and BCA (AI).

The recommendations put forward by PRC after a review of report submitted by CRC is to be taken into consideration and suggested changes are put forward to the BOS for approval.

2: To introduce new schemes of BCA (Cloud) and BCA (AI), since number of years of the courses is 3 years

The recommendations put forward by PRC after a review of report submitted by CRC is to be taken into consideration and suggested changes are put forward to the BOS for approval.

3: To introduce the schemes of BCA (Cloud) and BCA (AI)
The recommendations put forward by PRC after a review of report submitted by CRC is to be taken into consideration and suggested changes are put forward to the BOS for approval.

A thorough review of the suggestions are done and complete report is put forward to BOS committee.

INVERTIS
UNIVERSITY BAREILLY

Date: 17/02/2021

To
Vice-Chancellor
Invertis University
Bareilly

Sub: Regarding organizing BOS

Respected sir,

In pursuance of to introduce new programs, the schemes of BCA (Cloud) and BCA (AI) based on the recommendations by CRC and PRC reports, we are organizing a BOS on 10/03/2021 at Conference Hall (AB-III) from 3:30 PM onwards.

We request you to give permission to conduct the BOS so that we can finalize on the recommended points by pre-BOS and do the necessary modifications in the scheme.

Thanking You. Jitendra

Mr. Jitendra Kumar Chaudhary
HOD
Dept. of Computer Applications.

ANNEXURE-IV(Attendance)

1. Mr. Jitendra Kumar Chaudhary
2. Mr. Amit Taneja
3. Mohd. Shakeel
4. Mr. Kushal Johari
5. Ms. Archana Saxena
6. Ms, Shivangi Ghildiyal

FACULTY OF COMPUTER APPLICATION

Scheme & Syllabus
For
Bachelor of Computer Application
(Specialization in Artificial Intelligence)

(Implemented from Academic Session 2019-20)

Version			
Applicable for Back Examination(Session)	Nil		
Date of BOS/BOF/AC			
Page No. Where Major/Minor Changes have been done	First Version (Not Applicable)		
Implemented from (Session)	Session 20__		
Scheme and Syllabus Page Number			

Total Credit of the Program

Sem	I	II	III	IV	V	VI	Total
Credits	22	24	25	21	25	20	137

June 2019

FACULTY OF COMPUTER APPLICATION

Bachelor of Computer Application
(Specialization in Artificial Intelligence)

Evaluation Scheme

Marks	Theory	Practical	Dissertation/Thesis
Maximum Marks	100	100	100
Internal Marks	40%	60%	20%
External Marks	60%	40%	80%

- **Practical and theory courses are mentioned in the form of L-T-P, Where**
  L- Lecture
  T- Tutorial
  P- Practical

- **Elective courses are clearly Mentioned as "Elective" if more than one than "Elective-I, II…"**

- **Any zero Credit courses are Treated as Pass/Audit Course**

Scheme

CTPL ACADEMY

TEACHING AND EXAMINATION SCHEME FOR

BCA (Common for all Specializations CTIS, DS, UI/UX, AI)

Semester I

S. No.	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAI101	ENG	English-I	3	0	0	3	3
2	BCAI102	BS	Theory of Mathematics	3	0	0	3	3
3	BCAI103	PC	Computer Architecture & Organization	3	0	0	3	3
4	BCAI104	PC	Programming in C	3	0	0	3	3
5	BCAI105	PC	Client Side scripting	3	0	0	3	3
6	BCAI106	PC	Office Automation Lab	0	0	4	4	2
7	BCAI107	PC	Programming in C Lab	0	0	2	2	1
8	BCAI108	PC	Client Side scripting Lab	0	0	4	4	2
9	BCAI109	HSM	Effective Communication Skills	0	0	4	4	2
			TOTAL	15	0	14	29	22

CTIS – Cloud Technology and Information Security
DS – Data Science
UI/UX – User Interface/User Experience
AI – Artificial Intelligence

L*-Lecture, T*-Tutorial, P*-Practical

CTPL ACADEMY

TEACHING AND EXAMINATION SCHEME FOR

BCA (Common for all Specializations CTIS, DS, UI/UX, AI)

Semester II

S.No.	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAI201	ENG	English-II	3	0	0	3	3
2	BCAI202	PC	Linux Shell Scripting	3	0	0	3	3
3	BCAI203	PC	Object Oriented Programming Using Java	2	0	0	2	2
4	BCAI204	PC	Operating Systems	3	0	0	3	3
5	BCAI205	PC	Data Structures using C	3	0	0	3	3
6	BCAI206	BS	Environmental Studies	3	0	0	3	3
7	BCAI207	PC	Data Structures using C Lab	0	0	4	4	2
8	BCAI208	PC	Linux Shell Scripting Lab	0	0	2	2	1
9	BCAI209	PC	Object Oriented Programming Using Java Lab	0	0	4	4	2
10	BCAI210	HSM	Personality Development	0	0	4	4	2
			TOTAL	17	0	14	31	24

CTIS – Cloud Technology and Information Security
DS – Data Science
UI/UX – User Interface/User Experience
AI – Artificial Intelligence

L*-Lecture, T*-Tutorial, P*-Practical

CTPL ACADEMY

TEACHING AND EXAMINATION SCHEME FOR

BCA (Specialization in AI)

Semester III

S.No.	COURSE CODE	COURSE TYPE	COURSE NAME	L*	T*	P*	CONTACT HOURS	CREDIT POINT
1	BCAI301	PC	DBMS	3	0	0	3	3
2	BCAI302	PC	Computer Networks	3	0	0	3	3
3	BCAI401	PC	Python Programming	3	0	0	3	3
4	BCAIAI301	PC	Statistics and Probability	3	1	0	4	4
5	BCAIAI302	PC	Digital Electronics	3	0	0	3	3
6		PE	Elective-I	3	0	0	3	3
7	BCAI303	PC	DBMS Lab	0	0	4	4	2
8	BCAI402	PC	Python Programming Lab	0	0	2	2	1
9	BCAI304	HSM	Business communication and Presentation Skills	0	0	4	4	2
10	BCAI305	ST	Summer Project Seminar I	0	0	2	2	1
			TOTAL	18	1	12	31	25

AI – Artificial Intelligence

Course Code	Program Elective-I
BCAIAI303	Data Visualization
BCAIAI304	Business Intelligence

L*-Lecture, T*-Tutorial, P*-Practical

CTPL ACADEMY

TEACHING AND EXAMINATION SCHEME FOR

BCA (Specialization in AI)

Semester IV

S.No.	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAIAI401	PC	Introduction to RPA Tools	3	0	0	3	3
2	BCAIAI402	PC	Introduction to Artificial Intelligence	3	0	0	3	3
3	BCAIAI403	PC	Sensor Technology	3	0	0	3	3
4	BCAIAI404	HSM	Business Process Management	3	0	0	3	3
5		PE	Elective-II	3	0	0	3	3
6	BCAIAI407	PC	Introduction to Artificial Intelligence Lab	0	0	4	4	2
7	BCAIAI408	PC	Introduction to RPA Tools Lab	0	0	4	4	2
8	BCAI403	PC	Logical Reasoning and Thinking	0	0	4	4	2
			TOTAL	15	0	12	27	21

AI – Artificial Intelligence

Course Code	Program Elective – II
BCAIAI405	Introduction to Data Science
BCAIAI406	Pattern Recognition

L*-Lecture, T*-Tutorial, P*-Practical

CTPL ACADEMY

TEACHING AND EXAMINATION SCHEME FOR

BCA (Specialization in AI)

Semester V

S. No	COURSE CODE	COURSE TYPE	COURSE NAME	L*	T*	P*	CONTACT HOURS	CREDIT POINTS
1	BCAIAI501	HSM	Six Sigma and Lean Methods	3	0	0	3	3
2	BCAIAI502	PC	Digital Image Processing	2	0	0	2	2
3		PE	Elective-III	2	0	0	2	2
4		PE	Elective-IV	3	0	0	3	3
5		PE	Elective-V	3	0	0	3	3
6		GE	Generic Elective-I	3	0	0	3	3
7	BCAIAI511	PC	Digital Image Processing Lab	0	0	2	2	1
8		PE	Elective-III Lab	0	0	2	2	1
9	BCAI501	PR	Mini Project	0	0	8	8	4
10	BCAI502	HSM	Working Towards Placements	0	0	4	4	2
11	BCAI503	ST	Summer Project Seminar II	0	0	2	2	1
TOTAL				16	0	18	34	25

AI – Artificial Intelligence

Course Code	Program Elective-III
BCAIAI503	Test Automation using Selenium
BCAIAI504	Software Testing

Course Code	Program Elective-V
BCAIAI507	Embedded Systems
BCAIAI508	Design Thinking

Course Code	Program Elective-IV
BCAIAI505	Introduction to web Services
BCAIAI506	Digital Signal Processing

Course Code	Generic Elective-I
BCAIAI509	Introduction to IoT
BCAIAI510	Cloud Computing

Course Code	Program Elective-III Lab
BCAIAI512	Test Automation using Selenium Lab
BCAIAI513	Software Testing Lab

L*-Lecture, T*-Tutorial, P*-Practical

CTPL ACADEMY

AND EXAMINATION SCHEME FOR

BCA (Specialization in AI)

Semester VI

S.No	COURSE CODE	COURSE TYPE	COURSE NAME				CONTACT HOURS	CREDIT POINTS
				L*	T*	P*		
1	BCAI60	ST	Major Project / Internship	-	-	40	40	20
			TOTAL	-	-	40	40	20

AI – Artificial Intelligence

L*-Lecture, T*-Tutorial, P*-Practical

Syllabus
Semester – I

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-101: English-I

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:* To train students to be comfortable with everyday communication. Training the students in English grammar.

Unit I: Everyday Conversations

- Introducing self / others
- Weather
- Classroom
- Asking about facilities around
- Describing a person / thing

Points to cover: Vocabulary, grammar, Construction of sentences, listening.
Methodology: Role plays, Videos, Classroom conversation, worksheets.

Unit II: Asking for.

- Help/ Suggestion/ ideas
- Clarification/ Directions
- Time/ food
- Advice
- Uses

Points to cover: Vocabulary, grammar, Construction of sentences, listening.
Methodology: Role plays, Videos, Classroom conversation, worksheets.

Unit III: Reporting/ Describing

- Incidences
- Personalities
- Experiences
- Wants/Needs
- Intentions

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Unit IV: Meeting People

- Greetings
- Starting the Conversation
- Small talks
- Closing the conversation

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Unit V: Expressing

- Happiness/Displeasure
- Preferences
- Doubts
- Views
- Unawareness

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Talking about….

- Interests
- Different Cultures
- Clothes , cars, institutes, situations
- Schedules, prices

Points to cover: Vocabulary, grammar, Construction of sentences, listening
Methodology: Role plays, Videos, Classroom conversation, worksheets

Text Books:

1. Speak Now Level I & II, Oxford Press
2. Business Benchmark, Level – Upper Intermediate by Cambridge University Press.

Reference Books:

1. Practical English Usage by Michel Swan, Oxford University Press
2. Cambridge Grammar for English: A comprehensive Guide for spoken & written English (South Asian edition), Cambridge University Press.

Course Outcome:

The students will have a better understanding of English grammar. The students will be able to use grammar more effectively in their verbal and written communication.

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-102: Theory of Mathematics

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To develop the skills in the areas of Matrices, Sets, relations and functions, Differentiation and Integration.
- Mathematics concepts serves as a pre-requisite for post graduate courses, specialized studies and research.

Unit I: Sets, relations and functions

Definition of Set, Type of Sets, Operations on Sets, Venn diagram, Cartesian Product, Relations, Functions, Types of function, Some elementary functions with their graphs (Exponential, logarithmic, modulus), Limit & continuity of a function (Simple Problems).

Unit II: Matrices and Determinants

Types of Matrices, Operations of addition, Scalar Multiplication and Multiplication of Matrices, Determinant of a Square Matrix, Minors and Cofactors, Transpose, adjoint and inverse of a matrix, solving system of linear equations, in two or three variables using inverse of a matrix.

Unit III: Limits, Continuity and Differentiation

Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities. Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions

Unit IV: Coordinate Geometry

2D Cartesian Co-ordinate system, Straight line: (Equation & Slope of a line), Circle: Equation of Circle, Equation to Tangent, Conic Sections: Focus, Eccentricity, Directrix, Axis of a conic section, Parabola & Ellipse: (Definitions, equations and shape of curve only)

Unit V: Statistics and Probability

Introduction, definition, terminologies in statistics and probability, measure of central tendency and dispersion, probability distribution – continuous and discrete, Bayes theorem, testing of hypothesis, basics of ANOVA, Correlation and Regression Analysis.

Text Book:

1. Mathematics for BCA by G. C. Sharma & Madhu Jain, Oscar Publication
2. Mathematics Vol-2 by R. D. Sharma, Dhalpat Raj & Sons

Reference Books:

1. The Elements of Co-ordinate Geometry Part-I by S. L. Loney, Book Palace, New Delhi.

Course Outcome:

After completion of the course the student will be able:

- To know and define the use of basic concepts of Matrices.
- To apply the concept of set relation and functions in functions.
- To know the methods and rules of calculus.
- To understand the basics 2D Cartesian Co-ordinate system, Straight line.
- To know the basics of statistics and probability for computer science.

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-103: Computer Architecture & Organization

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To understand the fundamentals of computer organization and architecture and to relate these to contemporary design issues. Understanding the performance characteristics of computer system.

Unit I: Register Transfer and Micro-operation

Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. Arithmetic Micro-operations: Binary Adder, Binary Adder-Subtrator, Binary Incrementor, Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit.

Unit II: Basic Computer Organization

Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions.

Unit III: Micro Programmed Control Unit

Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines, Design of Control Unit, Central Processing Unit: Introduction, General Register Organization, Stack Organization: Register stack, Memory stack; Instruction Formats, Addressing Modes.

Unit IV: Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms, Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors.

Unit V: Modes of Data Transfer and Memory Organization

Modes of Data Transfer: Priority Interrupt, Direct Memory Access, Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory

Text Books:

1. Computer System Architecture by Morris Mano, PHI
2. Computer Organization and Architecture by William Stallings, PHI

Reference Books:

1. Digital Computer Electronics: An Introduction to Microcomputers by Malvino, TMH
2. PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson, O'Reilly, 2nd Edition , 2010
3. Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons
4. Fundamental Of computer Organization by Albert Zomaya, 2010.

Course Outcome:

- Explain the use of basic concepts of Computer components.
- Discuss the Register Transfer and different Micro-operations
- Illustrate the flowchart for Instruction cycle
- Describe the function of Control Unit and Central Processing Unit
- Explain the characteristics of multi-processors.
- Discuss the modes of Data transfer and Memory organization

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-104: Programming in C

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments.
- The object oriented platforms and event driven systems use procedural languages for coding integral command content. C is an important procedural language and was developed initially to write the UNIX operating system.
- UNIX operating system, C compiler and all UNIX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms.
- This course focuses on all the basic concepts, syntax and constructs of the C language. For students, who are new to programming, this unit can be considered as the starting point before taking up any other programming oriented units.
- The students will be implementing the concepts explained here to create simple to complex programs.

Unit I: Introduction to Programming:

Problem Solving Using Computers**:** Language Classification, Problem Analysis, Algorithm and Flowchart design. **Algorithms:** Steps in developing algorithms, advantages and disadvantages. **Flowcharts:** Symbols used in developing flowcharts, advantages and disadvantages. Coding, testing, debugging, Documentation and maintenance. Program development and modular design.

Unit II: Fundamentals of C programming and Control Structures:

History, Structure of a C program, C Conventions, Character Set, Identifiers, Keywords, Simple Data types, Modifiers, Variables, Constants, Operators (Arithmetic operator, relational operator, logical operator, ternary operator, unary operator, shorthand operator, bit-wise operator and arithmetic operator) Operator precedence. Input and Output operation: Single character input and output, formatted input and output, Buffered input.

Control Structures: Introduction, Conditional statement, if statement, if-else statement, nested if statement, else-if statement and switch statement. Goto statement. Looping statement, while statement, do-while statement, for statement, break and continue, nested for statement

Unit III: Arrays and Functions:

Arrays: Introduction (One and multi-dimensional), Declaration of arrays, Initialization of arrays, processing with arrays. String manipulation, declaration of string arrays, string operations.

Functions: Introduction, advantages of subprograms, Function definition, function call, Actual and formal arguments, local and global variables, function prototypes, types of functions, recursive functions, arrays and functions.

Unit IV: Storage Classes, Structures, Unions and Pointers:

Storage Classes, Structures and Unions: Introduction, types of storage classes, Introduction to structures, Advantages of structures, accessing elements of a structure, nested structures, array of structures, functions and structures, Unions, bit-fields, enumerated data types.

Pointers: Introduction, pointer variable, pointer operator, pointer arithmetic, pointers and arrays, pointers and strings, array pointers, dynamic allocation

Unit V: Files, Preprocessor, standard library and header files:

Files: Introduction, File data type, opening and closing a file, file functions (getc, putc, getw, putw, fscanf, fprintf, fread, fwrite, fgets, fputs, feof).
Preprocessor: #define, #include, #undef, Conditional compilation directives, **C standard library and header files**: Header files, string functions, mathematical functions, Date and Time functions

Text Book:

1. Forouzon A Behrouz, Gilberg F Richard, A Structured Programming Approach using C - 3rd Illustrated Edition, 2009.
2. Kanetkar, Yashavant: "Let Us C", 6th Edition. BPB Publications.
3. Balagurusamy, E: "Programming in ANSI C" 3rd Edition. Tata McGraw-Hill

Reference Books:

1. The C programming Language by Richie and Kernighan, 2004, BPB Publication
2. Gottfried, Byron S: "Programming with C", 1996. Tata McGraw-Hill
3. Deitel, H M and Deitel P J: "C How to Program", 2nd Edition. Prentice-Hall

Course Outcome:

After completion of the course the student will be able:

- To be able to use the basic concepts of Computer components.
- To be able to design, implement, test, debug and document programs in C.
- To be able to use functions, and functions with parameters passing option.
- To be able to use pointers and arrays, perform pointer arithmetic.
- To be able to understand the advance topics in C like file handling functions and the concept of Standard C library.
- To be able to learn the concept of C preprocessor and its application in program development.

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-105: Client Side Scripting

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To introduce students to web technologies such as HTML, CSS, XML, Java Script teach them to create static and simple dynamic web pages or applications using these technologies and to understand web application deployment and software architectures.
- Students will learn basic web application design, development and testing skills.
- On completion of this course the learner should be able to design and implement a variety of dynamic Website

Unit I: Introduction to the Internet and the World Wide Web

Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture
Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development. HTML, CSS, JS, XML; HTTP, secure HTTP, etc.; URL, Web Services – SOAP, REST.

Unit II: HTML, CSS & JavaScript

Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images.
Introduction to CSS, Syntax, Selectors ,Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing.
Introduction to JavaScript: Data types, variables, operators, expressions, statements, functions, objects, arrays, date, math, error handling, flow control, loops

Unit III: XML and HTML5, CSS3

Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM.
Introduction to HTML5, CSS3, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geolocation, Microdata, Drag and Drop. Browser life cycle and browser rendering stages. Service workers.

Unit IV: Practical website development

Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures, web authoring tools, Web hosting, website maintenance, generating traffic to your website.

Unit V: PHP Server side scripting

Introduction to PHP, Basic Syntax, Variables, constants and operators, Loops, Arrays and Strings, Environment & environment variables, responding to HTTP requests, Files, Cookies, Sessions, Examples.

Text Books:

1. Practical Web Design for Absolute Beginners, Adrian W. West. Apress 2016
2. Introducing Web Development, Jorg Krause. Apress 2017.
3. HTML & CSS: The Complete Reference, Thomas Powell. McGraw Hill, Fifth Edition, 2010
4. Creating a Website: The Missing Manual, 3rd Edition, Mathew Macdonald. O'Reilly
5. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax Black, Kogen Learning Systems (Dreamtech Press), 5th Edition 2009.

Reference Books:

1. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow- Wiley Publishing Inc, 2010
2. HTML5 & CSS3 for the Real World, 2 Edition, Alexis Goldstein, Estelle Weyl, Louis Lazaris. Apress 2015.
3. HTML5 & CSS3 for Dummies, Andy Harris. Wiley 2014.
4. Learning PHP A Gentle Introduction to the Web's Most Popular Language, David Sklar. O'Reilly 2016.
5. Build Your Own Database Driven Web Site Using PHP & MySQL, Kevin Yank. Sitepoint , 4th Edition, 2009.

Course Outcome:

Students will gain the knowledge and skills required to develop Simple Web Applications. They should be able to:

- Explain basic Client-Server web architecture
- Understand working of web protocols like HTTP, TCP/IP, DNS as well as IP and web address resolution schemes such as URIs/URLs and DNS
- Use and recognize commonly used HTTP request and response messages
- Differentiate and create both static and dynamic web applications
- Understand and use HTML/CSS and XML
- Create static web pages using HTML & CSS
- Understand and use PHP for server side scripting
- Create simple dynamic web pages supporting user interaction using HTML, CSS &Java Script

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-106: Office Automation Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

1. Installing Operating Systems and Basic Software

2. **MS Word**

1. Prepare a document about any tourist destination of your choice with appropriate pictures and editing features.

2. Prepare a News Paper Layout. Insert appropriate pictures wherever necessary. Use the following Features:

- •Three Column and Four Column setting
- •Set One or Two Advertisements
- •Use Bullets and Numbering.

3. Create a Document consisting of Bio-data. It includes

- •A table giving your qualification and/or experience of work. Table should be Bordered and Shaded.
- •A Multilevel list giving your areas of interest and further areas of interest. The sub areas should be numbered as
- •'a', 'b', etc while the areas should be numbered as '1', '2', etc.
- •The information should be divided in “General” and “Academic” sections.
- •The header should contain “BIO-DATA” while the footer should have page numbers in the format Page 1 of 10.
- •Assign a password for the document to protect it from unauthorized access.

4. Assume that you are coordinating a seminar in your organization. Write a letter to 10 different IT companies asking them to particAIte in the seminar using mail merge facility.

5. Prepare a document which contains template of marks card of students. Assume that there are 10 students. The footer for the document should be ' University Name '.

6. Prepare a document about any topic In mathematics which uses mathematical symbols. (At least 5 mathematical symbols should be used). Assign a password for the document to protect it from unauthorized access. Demonstrate the use of Hyperlink Option. Sets margins to your document, a font of size and double spaced document.

3. MS – Excel

1. Open a new workbook, save it as JavaCoffeeBar.xls. In sheet1 write following sales data for Java Coffee bar to show their first 6 months sales.
   - •Select cell B4:D4 and change the horizontal alignment to center and text to 90 degree.
   - •All titles should be in bold
   - •Format all cells numbers to currency style and adjust width as necessary.
   - •Add border to data.
   - •Select the cell range A1:H1, merge and center these cells. Apply same format to A2:H2.
   - •Give border, shading and pattern to data in sheet
   - •Apply different font settings for all titles in sheet
   - •Apply green color and bold setting to sales above 10000 (use conditional formatting)
   - •Rename current worksheet as FirstHalfSales
2. Prepare a worksheet to maintain student information. The work sheet should Contain Roll Number, Name and marks in 5 subjects. (Max Marks is 100).Validate the marks. Calculate the total marks. Assign the grade according to the following. Assign grade 'A' if the total marks is above 450. From 401 to 449 assign the grade as 'B'. From 351 to 400 assign the Grade as 'C'. From 300 to 350 the grade to be assigned is 'D'. For the total marks less than 300 No grade is assigned. A student is eligible to get a grade only when he gets 40 and above in all the subjects. In such cases the grade is “FAIL”. (Assume that there are 10 students).
3. Prepare a pay-bill using a worksheet. The work sheet should contain Employee Id, Name, Designation, Experience and Basic Salary and Job ID. If Job Id is 1 then DA is 40% of the basic salary. HRA is Rs. 4500. If Job Id is 2 then DA is 35% of the basic salary. HRA is Rs. 3500. If Job Id is 3 then DA is 30% of the basic salary. HRA is Rs. 2500. If Job Id is 4 then DA is 25% of the basic salary and HRA is RS.2500. For all the other Job ids DA is 20% of the basic salary and HRA is Rs. 1500. For all the above Job ids PF to be deducted is 4%. For the job ids between 1-4Rs. 100 to be deducted as Professional Tax. Find the net pay.
4. For the above employee worksheet perform the following operations
   - Use filter to display the details of employees whose salary is greater than 10,000.
   - Sort the employees on the basis of their net pay
   - Use advance filter to display the details of employees whose designation is "Programmer” and Net Pay is greater than 20,000 with experience greater than 2 yrs

11. Using Excel project the Product sales for any five products for five years.
    - Compute the total sales of each product in the five years.
    - Compute the total sales of all the products in five year.
    - Compute the total sales of all products for each year.
    - Represent annual sale of all the products using Pie-Chart.

- Represent annual sales of all products using Bar Chart.
- Represent sale of a product for five years using Pie-Chart.
- Label and format the graphs

12. Create a statement of Telephone Bill Charge for a customer.
    - Telephone Calls
    - Up to 150 calls- free
    - 151 to 500 calls- 0.80 per call
    - 501 to 1000 calls- 1.00 per call
    - 1001 to 2000 - 1.25 per call
    - Above 2000- 1.40 per call
13. Perform Following:
    - Using Excel write sales data with columns product, month and sales. Write at least 5 records. Create Pivot Table chart and Report for the data.
    - Create a macro to change the name of worksheet as Macro Example, merge first three columns of first row and write heading as DATA in green color with yellow background
    - Link word document in excel worksheet to show the usage of linking and embedding.

4. MS – PowerPoint

14. Assume that you are going to give a presentation about Information Technology. (Choose some latest technologies). The presentation should have minimum 10 slides. Insert appropriate images wherever necessary. Use proper formatting, Diagrams and tables. Show the usage of action buttons, hyperlinks, and animations.

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-107: Programming in C Lab

L=0, T=0, P=2, C=1 **MM 100**

Part A

1. Printing the reverse of an integer.
2. Printing the odd and even series of N numbers.
3. Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().
4. Input a string and find the number of each of the vowels appear in the string.
5. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
6. Printing the reverse of a string.

Part B

1. Searching an element in an array using pointers.
2. Checking whether the given matrix is an identity matrix or not.
3. Finding the first N terms of Fibonacci series.
4. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.
5. Define a structure with three members and display the same.
6. Declare a union with three members of type integer, char, string and illustrate the use of union.
7. Recursive program to find the factorial of an integer.
8. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
9. Arranging N numbers in ascending and in descending order using bubble sort.
10. Addition and subtraction of two matrices.
11. Multiplication of two matrices.
12. Converting a hexadecimal number into its binary equivalent.
13. Check whether the given string is a palindrome or not.
14. Demonstration of bitwise operations.
15. Applying binary search to a set of N numbers by using a function.
16. Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-108: Client Side Scripting Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

1. Design a simple web page with head, body and footer, with heading tags, image tag
2. Design a web site for book information, home page should contain books list, when particular book is clicked, information of the books should display in the next page.
3. Design a page to display the product information such as name, brand, price and etc with table tag
4. Design a web site for book information using frames, home page should contain two parts, left part should contain books list, and right part should contain book information.
5. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements.
6. Design a web page with nice formatting like background image, text colors and border for text using external CSS.
7. Design a web page to perform mathematical calculations such as addition, subtraction, multiplication, and division using form elements and Java Script.
8. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements and display them into other pages using Java Script.
9. Design a web page to display timer in the left side of the web page using Java Script.
10. Design a web page to capture the student details such as student number, name, age, marks using Java Script Object.
11. Design a web page to read data from an XML file and display the data in tabular format, take the data as employee information.
12. Design a web site for online purchase using CSS, JS and XML, web site should contain the following web pages.
    - Home page
    - Login page
    - Signup page
    - Product details page
13. Design a web site for Student details using PHP, web site should contain the following web pages.
    - Home page
    - Login page
    - Signup page
    - Student details page

Semester I **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-109: Effective Communication Skills

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To train students in how to be effective communicators by practicing various skills and also help them in becoming well-groomed individuals in terms of both verbal and non-verbal communication

Unit I: Communication Process

What is communication? The communication model, elements of communication, Importance of effective communication skills in the business world, Components of Communication Process, practicing effective communication, good communication Vs effective communication, styles of communication, intercultural communication skills- need for attitude change and benefits

Unit II: Types of Communication & Barriers to communication

Verbal Communication, Non Verbal Communication, Written Communication, Do's and don'ts of each type, barriers to effective communication and how to overcome them, interaction of verbal and non-verbal communication, talents of a corporate communicator, silence- merits and limitations of each type

Unit III: Listening Skills & Reading Skills

What is listening, various types of listening – Active, passive, selective, listening and note taking, listening and comprehending, listening to speak, principles of good listening
Techniques to develop effective listening skills, Reading Skills- skimming, scanning and inferring- common reading techniques, practicing smart reading.

Unit IV: Conversation Skills

Importance of conversation skills, features of a good conversation, Tips to improve Conversation skills, importance of questioning skills, techniques to ask right questions- role play situations to practice the same, discussing issues (social, political and cultural), formal and informal conversation

Unit V: Telephone Etiquette

Basic rules of telephone etiquette- formal vs. informal; tone, pitch and vocabulary related to formal ways of speaking over the phone, leaving voice messages; practice sessions (role plays)

Persuasive communication

What is persuasive communication, different techniques of persuasive communication, How to negotiate using persuasive communication, the act of negotiation, negotiation style and their contexts, fundamentals of negotiation, common hurdles in negotiation and how to overcome them

.**Text Books:**

1. "Active Listening 101: How to Turn Down Your Volume to Turn Up Your Communication Skills, by Emilia Hardman, 2012
2. The Power of Communication: Skills to Build Trust, Inspire Loyalty, and Lead Effectively, by Helio Fred Garcia, 2012

ReferenceBooks:

1. Power Listening: Mastering the Most Critical Business Skill of All, by Bernard T. Ferrari, 2012
2. Fitly Spoken: Developing Effective Communication and Social Skills, by Greg S. Baker, 2011
3. The Secrets of Successful Communication: A Simple Guide to Effective Encounters in Business (Big Brain vs. Little Brain Communication), by Kevin T. McCartney, 2011.

Course Outcome

- In the end of the course, students will be able to channelize areas of communication in which they need to improve and use communication more effectively to get their messages across to people more clearly.

Syllabus
Semester – II

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-201: English -II

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- To teach students in English Grammar and make them proficient in usage of grammar.

Unit I: Comprehension (Can be taken any passage and identify the below points)

- Comprehension passage 1
- Comprehension passage 2
- Comprehension passage 3
- Comprehension passage 4
- Comprehension passage 5

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit II: Short Paragraph Writing

- Topic 1 - Punctuality
- Topic 2 - Nutrition
- Topic 3 - Exercise
- Topic 4 - Global Warming
- Topic 5 – Disciple Inflation
- Topic 6 - Demonetization

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit III: Review writing

Topic 1 – Book [can be a story review for average students]

Topic 2 - Movie review [different kinds of movies can be suggested too for practice]

Topic 3 – Another Movie review

Topic 4 – Hotel / Café / Recreations centre Review

Topic 5 – Electronic Gadget Review (Laptop/smart phone / speakers/ PSP/ etc.)

What is a review? How to write a review. Different types of reviews.

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit IV: Writing for Social Media

- Writing for social media: Face book, Linked-in
- Points to remember while writing on the social media. How to write Profile summary.
- What is a blog? How to write a blog?

Points to cover: Vocabulary, grammar, Construction of sentences.

Unit V: Presentations

- Formal Informal
- Debate
- Discussions
- Pick & Speak

Points to cover: Vocabulary, grammar, Construction of sentences.

Miscellaneous

Usage of Phrases & Idioms

Revision of English I & II

Text Books:

1. Practical English Usage by Michel Swan, Oxford University Press
2. Cambridge Grammar for English: A comprehensive Guide for spoken & written English (South Asian edition), Cambridge University Press

Reference Book:

1. How English Works by Michael Swan & Catherine Walter, Oxford University.

Course Outcome:

The students will have better understanding of usage of English Grammar in written communication.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI- 202: Linux Shell Scripting

L=3, T=0, P=0, C=3 **MM 100**

Course Objectives

- The course provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide.
- This unit provides examples to help the learners get a better understanding of the Linux system. The unit also provides the guidelines for the learners to take up vendor certifications.
- The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting.

Unit 1: Introduction to UNIX:

History of UNIX - Unix Components/Architecture - Features of Unix – UNIX Environment and UNIX Structure - Posix and Single Unix specification - The login prompt - UNIX commands – Basic commands - echo, printf, ls, who, date,passwd, cal - Combining commands - Internal and external commands – type, man , more and other commands - theuser terminal, displaying its characteristics and setting characteristics - The root login - super user: sucommand - /etc/passwd and /etc/shadow files - Commands to add, modify and delete users.

Unit II: UNIX file system:

UNIX File basics - File types and Categories – File Organization – Directories - home directory and the HOME variable - Reaching required files- the PATH variable - Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent parent directories - File related commands – cat, mv, rm, cp, wc - File inodes and the inode structure. File links – hard and soft links – Head and tail commands - Cut and paste commands - The sort command - Special files /dev/null and /dev/tty - File attributes and permissions - The umask and default file permissions - ls command - Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions

Unit III: UNIX Process Management:

The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.

Unit IV: Vi Editor:

Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg.

Unit V: Shell programming:

Introduction – Need for Scripts – Creating and Calling the Script – The Shebang – Different ways of running a script - Using variables in Script – Reading Input – Integer Variables – Arithmetic Expressions – Read-only variables – Exporting variables – Arrays - Control Statements: If, Then, Else, While and Until, Classic For, Break and Continue, Case – Handling Script Parameters: Shift, Getopts – Shell Functions – Handling Conditional expression patterns and Regular expressions in scripts.

Text Books:

1. Sumitabha Das., UNIX Concepts and Applications. 4th Edition. Tata McGraw Hill, July 2017.
2. Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming- Cengage Learning – India Edition. 2009

Reference Books :

1. M.G. Venkatesh Murthy: UNIX & Shell Programming, Pearson Education.
2. Richard Blum, Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2 ndEdition , Wiley,2014.

Course Outcomes

Students can,

1. To enable the students to have a hands on practical exposure to the Linux Red Hat Enterprise and make them prepared for the RHCE Certification.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-203: Object Oriented Programming Using Java

L=2, T=0, P=0, C=2 **MM 100**

Course Objective*:*

- Object oriented programming is the most proven technique for developing reliable programs. It helps in increased productivity, reusability of code, decrease in the development time, and reduces cost of production to an extent.
- The cost of maintaining such systems have also considerably decreased. There are many languages which used the object oriented concepts and techniques. Some of them are C++, Java, Smalltalk, Objective-C, etc.
- Java is a purely object oriented language. Systems/applications created using java programming language reduces the need for developing and maintain complex and space consuming applications. Java has a lot of advantages of being simple, robust, platform independent, etc. Nowadays java is also found in the mobile phones.

Unit I: Introduction

History and Overview of Java, Object Oriented Programming, Control statements- if and for loop. Using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words, Data types - Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting. Automatic type promotion in Expressions Arrays. Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements.

Unit II: Classes

Class Fundamentals, Declaring objects, Assigning object reference variables. Methods - constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods. Using objects as parameters, Argument passing, Returning objects. Recursion, Access control, Introducing final, understanding static. Introducing Nested and Inner classes. Using command line arguments. Inheritance – Basics, Using super, method overriding, and Dynamic method Dispatch, Using abstract classes and final with Inheritance.

Unit III: Packages

Definition. Access protection importing packages. Interfaces: Definition and implementation. Exception Handling – Fundamentals, types, Using try and catch and Multiple catch clauses, Nested try Statements, throw, throws, finally. Java’s built-in exception, using Exceptions.

Unit IV: Multithreaded Programming:

Java thread model – main thread, creating single and multiple thread. Is alive ( ) and join ( ). Thread – Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi-threading. I / O basics – Reading control input, writing control output, Reading and Writing files. Applet Fundamentals – AWT package, AWT Event handling concepts, the transient and volatile modifiers. Using instance of using assert.

Unit V: JAVA Database Connectivity (JDBC)

Database connectivity – JDBC architecture and Drivers. JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements, handling SQL exceptions. Accessing result sets: types and methods. An example - JDBC application to query a database.
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Text Books:

1. The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

Course Outcome:

- Read and understand Java-based software code of medium-to-high complexity.
- Use standard and third party Java's API's when writing applications.
- Understand the basic principles of creating Java applications with graphical user interface (GUI).
- Understand the fundamental concepts of computer science: structure of the computational process, algorithms and complexity of computation.
- Understand the basic approaches to the design of software applications.
- Apply the above to design, implement, appropriately document and test a Java application of medium complexity, consisting of multiple classes

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-204: Operating System

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs.
- Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.
- This course covers the concept of operating system and its applications

Unit I: Introduction to Operating System

Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

Unit II: Process Management

Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. **Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit III: Storage Management

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. **Virtual Management**: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation **File-System Interface**: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics.

Unit IV: **File-System Implementation**:

File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery **Disk Managemen**t: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

Unit V: Protection and Security

Protection: Goals of Protection, Domain of Protection, Access Matrix, and Implementation of Access Matrix, Revocation of Access Rights, Capability- Based Systems, and Language – Based Protection. **Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

Text Books:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System,6thEdition,WSE (WILEY Publication)

Reference Books:

1. William Stallings, Operating System, 4th Edition, Pearson Education.
2. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
3. Nutt: Operating Systems, 3/e Pearson Education 2004.

Course Outcome:

- After learning the fundamental concepts in Operating system including how OS has evolved over the years and different components of OS, students will continue to more significant functions of OS like Process management, storage and memory management etc.
- This will provide the necessary information for students to extract maximum benefits out of the OS while developing programs, working with applications and etc.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-205: Data Structure Using C

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- A data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently.
- Different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks.
- This course covers the basic concepts of different data structures which are the basic building blocks of Programming and problem solving.

Unit I: Introduction to Data structures

Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

Unit II: Searching and Sorting

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort.

Unit III: Stack and Queue

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, Operations on all types of Queues.

Unit IV: Linked List

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

Unit V: Tree Graphs and their Applications:

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.

Text Book

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'

Reference Books:

1. Trembley and Sorenson Data Structures
2. E. Balaguruswamy Programming in ANSI C.
3. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
4. Tenenbaum, Data Structures Using C. Pearson Education, 200
5. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
6. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
7. Langsam, AusensteinMaoshe& M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

Course Outcome:

- Students will benefit from the knowledge of Data Structures and different operating one can perform on these like searching, sorting, stacking and etc.
- This forms a very strong foundation for programming in different languages that the students will take up in subsequent semesters or in any other course.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-206: Environmental Studies

L=3, T=0, P=0, C=3 **MM 100**

Unit I: Introduction and natural resources: Multidisciplinary nature and public awareness, renewable and non-renewable resources and associated problems, forest, water, mineral, food, energy and land resources. Introduction to natural resources, conservation of natural resources and human role.

Unit II: Ecosystem: Ecological concepts, concept of ecosystems, types of ecosystems, ecosystem structure and functioning, energy flow, food chains and food webs, ecological pyramids.

Unit III: Biodiversity and Conservation: Definition, genetic species and ecosystem diversity biogeographically, classification of Indian value of biodiversity at national and local levels, India as a mega-diversity nation, treats to biodiversity and endangered and endemic species of India, need for conservation of biodiversity.

Unit IV: Environmental pollution: Definition , causes, effect and control of air pollution , water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, electromagnetic pollution, nuclear hazards , human role in prevention of pollution, solid waste management, disaster management, floods , earthquake, cyclone, and landslide
Firework Safety: Combustion of firework and pollution (noise, smoke, fireworks fallout and residue pollution), heavy metal toxicity due to fireworks and associated health effects.

Unit V: Social Issue and Environment: Unsuitable to suitable development, urban problem related to energy and water conservation, environment protection act, wild life protection act, forest conservation act, environmental issues, population explosion, and family welfare programme. Environmental and human health HIV, women and child welfare, role of information technology on environment and human health.
Corruption: definition and reasons, details of organizations/agencies working against corruption, role of individual against corruption and mode of action.

Ethics: Meaning, nature, determinants and objectives of ethics, ethics and its relation to values norms and morals, Indian ethos, Swami Vivekananda and ethics.

Text/Reference Books

1. Fundamentals of Environmental Biology, K. C. Agrawal, Nidhi Publishers (Bikaner).
2. Fundamentals of Ecology, E.P. Odum, W.B. Saunders Co. (USA).
3. Fundamentals of Ecology, E. P. Odum, Natraj Publisher (Dehradun).
4. Ecology: Principles and Applications, J. L. Chapman & , M. J. Reiss, Cambridge University Press.
5. Atmospheric pollution, W. Buch , Tata McGraw Hill(TMH)
6. Professional Ethics and Human Values, M. Govindarajan, PHI Learning Private Limited (Delhi).
7. Corruption and Reform in India, Jennifer Bussell , Cambridge University Press.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-207: Data Structures using C Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

Part A

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.
6. Sort N numbers using merge sort.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-208: Linux Shell Scripting Lab

L=0, T=0, P=2, C=1 **MM 100**

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.
9. Write a shell script to print end of a Glossary file in reverse order using Array.
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.
13. Write a shell script to reverse a given integer.
14. Write a shell script to list the files arranged in descending order of their size.
15. Write a shell script to check whether the given string is palindrome or not.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-209: Object Oriented Programming Using Java Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

Part A

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1t000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Part B

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number f lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a textfileld that allows only numeric value and in specified length.
5. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

Semester II **BCA (Common for CTIS, DS, UI/UX and AI)**

BCAI-210: Personality Development

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To enhance and sharpen the various skills related to Personality Development and also make students aware of how to make use of these skills more effectively in team building and resolving conflicts both in personal and professional life.

Unit I: Personality & Self Esteem

Self-Management: discover yourself, skills and abilities, evaluate inner self, and expand your awareness, introspection, self- assessment, self-appraisal, self- development, self-interrogation, symptoms of negative attitude, anger management and positive attitude.
Definition of personality, Components of Personality, common personality types, Definition of Self Esteem, Factors related to self-esteem, SWOT analysis, Building Self Esteem, Definition of Attitude

Unit II: Interpersonal Skills & Working In team

What are interpersonal skills? Importance of Interpersonal Skills in the Business world, How to build relationships, approaches to team building, difference between a team and a group, kinds of teams, What is a team, Significance of working in team, Qualities required to be an effective Team Member, Skills required to build an effective TEAM, practice activities for team building
Leadership Skills: Leadership traits and trends, leadership in business , dynamics between Leadership and management, Leadership styles in India, analysing leadership theories in the context of globalisation and leadership abroad, leaders for new organizations, different styles of Leadership

Unit III: Time Management & Planning

Time as a resource, individual understanding of time, Effective time management Techniques, identifying time waster, achieving goals through effective time management, Time management Matrix – practice, multitasking, delegating, saying no assertively, relationship between time and stress management
Goal setting: concept of setting SMART goals, steps to achieve goals, career goals/ anticAIting career challenges, utilizing opportunities, mapping skills sets

Unit IV: Problem Solving & Decision Making

What is a problem? Different stages of resolving a problem, Different factors that influence decision making, Different stages of decision making.

Unit V: Conflict and stress Management

What is a conflict?, Consequences of Conflict – Good & Bad, main sources of Conflict, Techniques to handle conflicts – Lose – win, Lose- Lose, Win – Lose, WIN- WIN; Role plays to practice conflict management, maintaining a positive attitude

Stress Management: stress and its causes, handling stress, types of stress, managing stress through motivation, relaxation techniques.

Text Book:

1. How to win friends and influence people by Dale Carnegie, Ebury Publication, 2004
2. 7 habits of highly effective people by Stephen. R. Covey, Simon And Schuster, 2004
3. The Monk who Sold his Ferrari by Robin.S.Sharma, Jaico, 2003

Reference Books:

1. The Tipping Point: How little things can make a big difference- Malcolm Gladwell, little brown book group, 2004
2. How to stop worrying and start living- Dale Carnegie, Random House, 2003

Course Outcome:

After completion of the course the student will be able:

Students will develop knowledge and skills required to take up vendor certifications in the networking domain.

Syllabus
Semester – III

Semester III **BCA (Specialization in AI)**

BCAI-301: DBMS

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- A database management system (DBMS) is collection of software meant to manage a Database. Many popular databases currently in use are based on the relational database model.
- RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more.
- The course covers the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries. Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

Unit I: Introduction

Purpose of Database System -– Views of data – Data Models – Database Languages —Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases

Unit II: Relational Model

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals, Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables, Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL.

Unit III: SQL

Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User, Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

Unit IV: Database Design

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

Unit V: Transactions

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock-Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

Text Book:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006.

2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007.

Reference Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007.
3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.

Course Outcome

- Understand the Purpose of Database System
- Understand the relational model
- Describe Integrity Constraints
- Describe SQL fundamentals
- Understand Functional Dependencies
- Describe the concepts of transaction
- Understand ACID properties

Semester III **BCA (Specialization in AI)**

BCAI-302: Computer Networks

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

To understand the basics of networking and its underlying principles. This course enables learners to understand computer networking concepts, how they work, operate, communicate with ports and Protocols. Standards and models associated with networking technology and their troubleshooting mechanisms.

Unit I: Networking Fundamentals

Basics of Network & Networking, Advantages of Networking, Types of Networks, Types of Network Architecture, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling, media connectors, Introduction of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, Comparison between OSI model & TCP/IP model.

Unit II: Basics of Network Devices

Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, Modem, Ethernet standards, Ethernet Components, Point-to-Point Protocol, Address Resolution Protocol, Message format, transactions, Benefits of Wireless Technology, Types of Wireless Networks, Wireless network Components, wireless LAN standards, wireless security Protocols.

Unit III: Basics of Network, Transport and Application Layers

Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 and IPv6 Datagram Format, IPv4 addressing, IPv4 Subnetting, CIDR and VLSM, IPv6 Addressing, , Internet Control Message Protocol , Internet Group Management Protocol ,Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer Protocols

Unit IV: WAN Technology

Introduction to WAN, WAN Switching techniques, connecting to the Internet, Satellite-Based Services, Cellular Technologies, Technologies used for Connecting LANs, Remote Access Connections and technologies, Authentication and Authorization, Tunnelling and Encryption Protocols, Security Appliances and Security Threats.

Unit V: Troubleshooting Network

Trouble Shooting Networks: Command-Line Interface Tools, Network and Internet Troubleshooting, Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.

Text Book:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013

Reference Books:

1. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
2. CCNA Exploration Course Booklet: Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

Course Outcome:

After completion of the course the student will be able to:

- Explain the types of Network and its architecture
- Identify the function of each layer in OSI and TCP/IP Models
- Describe the Ethernet and wireless standards
- Discuss the functionality of Networking devices
- Demonstrate the IPv4 and IPv6 addressing types
- List the WAN Technologies
- Practice Network troubleshooting.

Semester III **BCA (Specialization in AI)**

BCAI-401: Python Programming

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To setup the environment to run the python programs
- To understand concepts about Data Types and Looping techniques
- To understand and implement the OOP concepts, Decorators, and Iterators
- To understand and build the Web Applications
- Debugging and Troubleshooting Python Programs

Unit I:

Introduction to Python

Introduction: Introduction to Python, Setting up the environment, Installing Python, Running python program, Python's execution model, Guidelines on how to write good, The Python culture, A note on the IDEs.

Built-in Data Types: Numbers, Immutable sequences, Mutable sequences, Set types, Mapping types – dictionaries, The collections module, Final considerations

Iterating and Making Decisions: Conditional programming, Looping, Putting this all together.

Unit II: Advanced Concepts

Functions, the Building Blocks of Code: Use of functions, Scopes and name resolution, Input parameters, Return values, Recursive functions, Anonymous functions, Function attributes, Built-in functions, importing objects.

Saving Time and Memory: map, zip, and filter, Comprehensions, Generators, Some performance considerations, Name localization, and Generation behavior in built-ins.

Advanced Concepts – OOP, Decorators, and Iterators: Decorators, Class and object namespaces, Attribute shadowing, Initializing an instance, Accessing a base class, Multiple inheritance, Static and class methods, Private methods and name mangling, The property decorator, Operator overloading, Polymorphism

Unit III: Web Development

The Edges – GUIs and Scripts: Scripting-The imports, Parsing Arguments, The business logic, GUI application- The import, The layout logic, The business logic, The tkinter.tix module,The turtle module, wxPython, PyQt, and PyGTK, The principle of least astonishment, Threading considerations.

Web Development Done Right: Django design philosophy, The Django URL dispatcher, Setting up Django, Adding the Entry model, Customizing the admin panel, Creating the form, Writing the views, Tying up URLs and views, Writing the templates, Writing a Flask view, Building a JSON quote server in Falcon.

Unit IV: Cloud Native Python

Building Microservices in Python: Modeling microservices, Building microservices, Testing the RESTful API.

Building a Web Application in Python: Getting started with applications, Working with Observables and AJAX, Binding data for the adduser template, Working on Observables with AJAX for the addtweet template, Data binding for the addtweet template, CORS - Cross-Origin Resource Sharing, Session management, Cookies.

Interacting Data Services: MongoDB terminology, Initializing the MongoDB database, Integrating microservices with MongoDB, Working with user resources, Working with the tweets resources.

Unit V: Exception Handling

Testing, Profiling, and Dealing with Exceptions: The anatomy of a test, Testing guidelines, Unit testing, Test-driven development, Exceptions, Profiling Python.

Debugging and Troubleshooting: Debugging with print, Debugging with a custom function, Inspecting the traceback, Using the Python debugger, Inspecting log files, Other techniques, Troubleshooting guidelines.

Text Books:

1. Learn Python Programming, 2nd Edition by Fabrizio Romano
2. Python Cookbook, 3rd Edition by David Beazley (Author), Brian K. Jones (Author)

Reference Books:

1. Python Programming: A Step-by-Step Guide For Absolute Beginners by Brian Jenkins and ATS Coding Academy
2. Python and AWS Cookbook: Managing Your Cloud with Python and Boto by Mitch Garnaat
3. Advanced Python Programming: Build high performance, concurrent, and multi-threaded apps with Python using proven design patterns by Dr. Gabriele Lanaro
4. Programming Google App Engine with Python: Build and Run Scalable Python Apps on Google's Infrastructure by Dan Sanderson

Course Outcome:

At the end of the course, students will be able to:

- Install and Run Python Program
- Write functions and Loops in the python program
- Implementing OOPs concepts while writing Python Program
- Developing web applications using Django
- Build microservices in Python
- Test, Debug and Troubleshoot Python Programs

Semester III **BCA (Specialization in AI)**

BCAIAI-301: Statistics and Probability

L=3, T=1, P=0, C=4 **MM 100**

Course Objectives:

- To understand the basic concepts of statistics and probability.
- To understand the description of data using statistical techniques
- To understand the summary of data using statistical measures
- To understand the statistical methods involved in hypothesis testing
- To understand the ANOVA and its importance in business performance.

Unit I: Descriptive Statistics

Data and Data Sources, Types of Data, Measures of Central Tendency – Mean, median mode for raw and grouped data, measures of dispersion – Range, standard deviation, variance, coefficient of variation, mean deviation, mean absolute deviation, measures of symmetry: Skewness and Kurtosis.

Unit II: Elements of Probability and Sampling Distributions

Experiments and events, Basic Relations of Probability, Conditional Probability, Joint Probability, conditional probability on discrete case and continuous case, computing expectations by conditioning, introduction to Bayes theorem, problems related to Bayes Theorem, Discrete Probability Distribution (Binomial and Poisson), Continuous Probability Distribution (Normal). Various types of Probability and Non-probability Sampling, Sampling distribution of important statistic.

Unit III: Hypothesis Testing

Introduction, Statistical assumptions for parametric test, Level of significance, confidence level, Type I Error, Type II error, Critical value, power of the test, sampling distribution, small sample test – t test, F test, Large Sample test – Z test for equality of single mean with population mean, equality of two sample mean, equality of single proportion with population proportion and equality of two sample proportions.

Unit IV: Correlation and Regression Analysis

Correlation analysis, properties, significance of single and multiple correlation coefficients, multiple and partial correlation, linear model, factor, effect, residuals, dependency, independency, assumptions of linear model, estimation of parameters of regression coefficients, properties, significance, diagnostic testing: auto correlation, multi collinearity, heteroscedasticity, normality, significance of estimated parameters in multiple linear regression,.

Unit V: Linear Model

Introduction, assumptions, factors and levels in ANOVA, layout of one way ANOVA, multiple comparison of sample means, one way analysis of variance with unequal sample sizes, two factor analysis of variance – introduction and parameter estimation, two way analysis of variance with interaction, Post ANOVA: testing of hypothesis for significance of mean using Fishers Least Significance Difference test (lsd), Tukeys test, Dunnet test, Duncan Multiple Range test.

Text Book:

1. Fundamentals of mathematical statistics – SC Gupta and VK Kapoor, Sultan Chand & Sons Publication, New Delhi

Reference Books:

1. Introduction to probability Models, Ninth Edition – Sheldon M. Ross, Elsevier Publication, Academic Press, UK
2. Introduction to Probability and Statistics for Engineers and Scientists, Third Edition - Sheldon M. Ross, Elsevier Publication, Academic Press, UK

Course Outcomes:

On successful completion of the module students will be able to:

- Able to know the importance of statistics in different research areas.
- Able to know the basic concepts of Statistics and its evolution.
- Able to apply suitable statistical measures to describe and summarize the data
- Able to apply t and f test for testing the statistical measures to know the significance.
- Able to apply ANOVA for testing significance of arithmetic mean and regression coefficients

Semester III **BCA (Specialization in AI)**

BCAIAI-302: Digital Electronics

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- Understand concepts of combinational and sequential circuits.
- Analyze the synchronous and asynchronous logic circuits.
- Understand concepts of memory, programmable logic and digital integrated circuits.
- Design Combinational and sequential systems.

Unit I: Basic Concepts, Boolean algebra, Theorems and Functions

Number Systems: Decimal number system, binary number system, octal number system, hexadecimal number system, BCD number system, Excess-3 code, Gray code, Alpha numeric code, error detecting and error correcting codes. Arithmetic: Arithmetic number representation, Binary arithmetic, Hexadecimal arithmetic, BCD arithmetic. Boolean algebra and Theorems: Logic gates and logic operations, Boolean theorems and postulates, SOP's & POS's, Minterms and Maxterms. Minimization of Boolean Functions: Algebraic simplification, Karnaugh map simplification, Quine-Mc Cluskey or Tabulation method.

Unit II: Logic Gates

Logic Families: Metal Oxide Semiconductor logic families- switching properties of NMOS and PMOS transistors, static NMOS, dynamic NMOS, Static CMOS and dynamic CMOS logic families, CMOS Transmission gate circuits, Bipolar logic families- switching properties of NPN and PNP transistors, TTL, Schottkey TTL, Comparison of MOS logic circuits(CMOS) with that of a TTL digital circuit, Tristate gates. Electrical characteristics: Meanings of speed, propagation delay, operating frequency, and power dissAIted per gate, supply voltage levels, operational voltage levels of various logic families.

Unit III: Combinational Systems

Binary arithmetic units (Adder, Subtractor, n-bit parallel adder & Subtractor, look ahead carry generator), decoder, encoder, multiplexer, Demultiplexer, code converters, Magnitude comparators, parity generators. Implementation of combinational logic by standard IC's.

Unit IV: Sequential Systems

Flip-flop and Latch: SR latch, JK flip-flop, T flip-flop, D flip-flop and latch, Master-slave RS flip-flop, Master-slave JK flip-flop, asynchronous inputs. Registers & Counters: Shift registers (SISO, SIPO, PISO, PIPO), universal shift register. Counters Asynchronous/Ripple counters, Synchronous counters, Modulus-n Counter, Ring counter, Johnson counter, Up-Down counter, asynchronous clear, preset and load in a counter, synchronous clear, preset and load in a counter, typical IC's for counters. Synchronous (Clocked) sequential circuits: Moore and

Mealey state machine circuits, Analysis & design of synchronous sequential circuits – State machine design with SM charts

Unit V: Memory and Programmable Logic

RAM, memory decoding, ROM, PROMs, PAL & PLA, Sequential Programmable Devices (discuss three major devices without going into their detailed construction).

Text Book:

1. Morris Mano M, Michael D. Ciletti, "Digital Design", Pearson Education, 4th Edition, 2007.
2. Charles H Roth (Jr), Larry L. Kinney, "Fundamentals of Logic Design", Cengage Learning India Edition, 5th Edition, 2010.
3. Floyd and Jain, "Digital Fundamentals", Pearson Education, 8th Edition, 2007.

Reference Book:

1. Ronald J. Tocci, "Digital Systems: Principles and Applications", Pearson Education, 10th Edition, 2009.
2. Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and Applications", Tata McGraw Hill, 6th Edition, 2008

Course Outcome:

- Understand different number systems and its inter-conversions.
- Understand the concept of Boolean algebra and its different theorems, properties etc.
- Understand simplification of Boolean functions.
- Understand the construction and working of different combinational circuits etc.
- Understand different flip-flops and its applications.
- Understand different sequential logic circuits and basic design of sequential circuits and counters.
- Understand different types of memories and its applications.

Semester III **BCA (Specialization in AI)**

Elective –I

BCAIAI-303: Data Visualization

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To understand the importance of data visualization in the business and engineering
- To understand the application and role of visualization tools in creating the advanced techniques.
- To understand the importance of vector visualization in multivariate data analysis
- To understand the impact of visualization techniques in ease the analytics decision making process.

Unit I: Introduction to Data Visualization

Brief history of data visualization, scientific design choices in data visualization- choice of graphical form, grammar of graphical techniques of large amount of data, crucial need of visualization techniques, challenges in visualization techniques, classification of visualization techniques for qualitative and quantitative data, power of visualization techniques, introduction to different visualization techniques.

Unit II:Static Graphical Techniques – 1

Introduction to bar graph, basic understanding of making basic bar graph, grouping bars together, bar graphs on counts, customization of bar graphs by changing colour, size, title, axis units, changing width and spacing of the bar chart, adding labels to bar graph, application of bar graph in business.

Unit III: Multivariate Graphical Techniques

Introduction to correlation matrix, application of correlation matrix in the multivariate analysis, network graph, basics of heat map, difference between heat map and tree map, introduction to higher dimensional scatter plot, axis adjustment in the higher dimensional scatter plot, addition of prediction surface of higher dimensional scatter plot.

Unit IV: Graphical Validation

Basics of multivariate statistical visual representations and its results, dendrogram, importance of dendrogram in grouping (cluster analysis), Scree Plot, importance of Scree Plot, application of Scree Plot in determining number of clusters and factors, QQ plot, importance of QQ plot in distribution of data for the further quantitative analysis, PP plot, applications and usage of PP Plot for distribution detection.

Unit V: Customization

Introduction to annotations – adding : text, mathematical expression , lines, arrows, shaded shapes, highlighting the texts and items, adding error bars, introduction to axis, swapping x and y axis, changing the scaling ration in the axis, positioning of axis and arranging tick marks and labels, changing the appearance of axis labels, circular graphs, using themes, changing the appearance of theme elements, creating the own themes, legends : removing the legends, position of legends, legend title, labels in legends.

Text Books

1. DATA VISUALIZATION PRINCIPLES AND PRACTICE, SECOND EDITION - Alexandru Telea, CRC Press.
2. Hand book of Data Visualization – Chun-houh Chen, Wolfgang Härdle, Antony Unwin, Springer Publication.

Reference Books

1. R Graphics Cook Book, Winston Chang, First Edition, O'Reilly Publication.
2. ggplot2 Elegant Graphics for Data Analysis – Hadley Wickham, Springer Publication

Course Outcome:

At the end of this course students able to

- Understand the application of different visualization tool for the business report representation.
- Understand the different visualization techniques to find out the distribution of data set.
- Understand the importance of visualization in multivariate environment.
- Understand the importance of customization of graphical representation of data in business communication

Semester III **BCA (Specialization in AI)**

Elective-I

BCAIAI-304: Business Intelligence

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To understand the basic concepts of Business Intelligence and its architecture.
- To understand the procedure for Business Performance management and business intelligence.
- To understand the importance of OLAP and Business Intelligence Data stages.
- To understand the different types of business intelligence, reporting and dash board design.
- To understand how the Business Intelligence system is implemented.

Unit I: Introduction to Business Intelligence

Introduction to Business Intelligence, A Framework for Business Intelligence (BI), Definitions of BI, A Brief History of BI The Architecture of BI, Styles of BI, The Benefits of BI, Event-Driven Alerts, Intelligence Creation and Use and BI Governance, A Cyclical Process of Intelligence Creation and Use, Intelligence and Espionage, Transaction Processing versus Analytic Processing, Successful BI Implementation, The Typical BI user Community, Appropriate Planning and Alignment with the Business Strategy, Real-Time, On-Demand BI Is Attainable, Developing or Acquiring BI Systems, Justification and Cost-Benefit Analysis, Security and Protection of Privacy, Integration of Systems and Applications , Major Tools and Techniques of Business Intelligence.

Unit II: Business Performance Management

Business Performance Management (BPM) Overview, BPM Defined, Comparison of BPM and BI, Operational Planning, Financial Planning and Budgeting, Pitfalls of Variance Analysis, Act and Adjust: What Do We Need to Do Differently?, Performance Measurement, Key Performance Indicators (KPI) and Operational Metrics, Problems with Existing Performance Measurement Systems, Effective Performance Measurement, BPM Methodologies, Balanced Scorecard (BSC) , Six Sigma, BPM Technologies and Applications, BPM Architecture, Commercial BPM Suites, BPM Market versus the BI Platform Market, Performance Dashboards and Scorecards, Dashboards versus Scorecards, Dashboard Design, important properties of design of dash board.

Unit III: Business Intelligence: Stages

Introduction, Extract, Transform, and Load (ETL), Data Warehouse, Data Warehouse Architecture, Design of Data Warehouses, Dimensions and Measures, Data Warehouse Implementation Methods: Top-Down Approach, The Bottom-Up Approach, The Federated Approach, The Need for Staged Data, Integrating Data from Multiple Operating Systems, OLAP, Types of OLAP, Multidimensional OLAP (MOLAP), Relational OLAP (ROLAP), Hybrid OLAP (HOLAP), Data Mining, Data Mining and Statistical Analysis, Data-Mining Operations, Data Mining—Data Sources, Data Dredging, Data Management, Data Usage, Enterprise Portal (EP).

Unit IV: Types of Business Intelligence

Multiplicity of BI Tools, The Problem with Multiple BI Tools, Types of BI, Enterprise Reporting, Cube Analysis, Ad Hoc Query and Analysis, Statistical Analysis and Data Mining, Alerting and Report Delivery, Modern BI, Enterprise Reporting, Support for Different Forms and Types, Support for Personalization and Customization, Support for Wide Reach, High Throughput and Access across All Touch Points, The Enterprise BI, Single Unified User Interface, Single Unified Backplane, Vision of a Critical BI System, Centralized Business Logic, Flexible Data Structures, Advanced Analytics, Reporting, Rich Report Design, Flexible Information Delivery, Self-Service Reporting, Critical BI for the Enterprise.

Unit V: Business Intelligence Implementation OPENSSH - The Introduction, Implementation of BI System: An Overview, BI Implementations Factors, Managerial Issues Related to BI Implementation , BI and Integration Implementation, Types of Integration, Levels of BI Integration, Embedded Intelligent Systems, Connecting BI Systems to Databases and Other Enterprise Systems, Connecting to Databases, Integrating BI Applications and Back-End Systems, Middleware, On-Demand BI, The Limitations of Traditional BI, The On-demand Alternative, Key Characteristics and Benefits, Issues of Legality, Privacy, and Ethics, Legal Issues, Privacy, Ethics in Decision Making and Support.

Text Books:

1. Business Intelligence: A Managerial Approach, 2nd Edition - Turban, Sharda Efraim; Ramesh, Dursun Delen and King, David. (2011), Prentice Hall.
2. Business Intelligence for Telecommunications – Deepak Pareek, Auerbach Publications.

Reference Book:

1. Applied Data Mining Statistical Methods for Business and Industry - PAOLO GIUDICI, John Wiley & Sons Ltd.
2. Data Mining: Concepts and Techniques, Second Edition - Han, Jiawei and Kamber, Micheline. (2009). San Francisco: Morgan Kaufmann Publishers.
3. Business Analysis for Business Intelligence - Bert Brijs, CRC Press.

Course Outcome:

- Understand the important terminologies and architecture of Business Intelligence system.
- Understand the important difference between business performance management and business intelligence.
- Understand the different OLAP systems used in Business Intelligence Report creations and analytics.
- Learn the different business intelligence types, and importance of report creation and dashboard design.
- Understand implementation procedure for business intelligence systems.

Semester III **BCA (Specialization in AI)**

BCAI-303: DBMS Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

1. Perform following actions using SQL statements
    a. Create a new user with name “shiva” and password “kumar@1”
    b. Assign the following privileges
        i. Create and drop tables
        ii. Create and drop users
        iii. Allow to assign above privileges to new users
        iv. List all tables in the database
        v. List all users in the database
        vi. Logout from current user and log in as “shiva”
2. Create following tables and insert minimum 10 rows in to each table
    a. Department table with following columns with appropriate data types
        i. DeptId
        ii. DeptName
        iii. DeptLoc
    b. Employee table with following columns with appropriate data types
        i. EmpId
        ii. EmpName
        iii. DOB
        iv. DOJ
        v. Job
        vi. Salary
    c. Product table with following columns with appropriate data types
        i. ProdId
        ii. ProdName
        iii. Price
    d. Sales table with following columns with appropriate data types
        i. SalesId
        ii. Date
        iii. Quantity
3. Update above tables with following features using SQL statements
    a. Make DeptId in Department table as Primary Key
    b. Make EmpId in Employee table as Primary Key
    c. Add DeptId column to the Employee table and make it foreign key from Department table and update the values
    d. Add EmpId and ProdId to the Sales table and make them foreign key from Employee and Product table and update the values

   e. Update all columns in all tables with appropriate constraint such as not null, check and so on
4. Perform the following SQL statements
   a. Create a view "EmpDeptView" from Employee and Department table which contains following columns
      i. EmpName
      ii. DOB
      iii. Salary
      iv. DeptId
      v. DeptName
      vi. Loc
   b. Retrieve all employees whose salary between 25,000 to 30,000
   c. Retrieve all employees who is working in Accounts department (If it is not there add this row to Department table)
   d. Retrieve all employees who is working other than Accounts department
   e. Retrieve all employee who is working in Sales department and Bangalore location
   f. Retrieve all employees who completed minimum 5 years
   g. Retrieve all employees who completed minimum 5 years and salary less than 30,000
5. Perform the following SQL statements
   a. Retrieve all employees whose salary more than 30,000
   b. Retrieve employee details who is getting maximum salary
   c. Retrieve employee details who is getting minimum salary
   d. Retrieve employee details who is getting 3rd maximum salary
   e. Retrieve employee details who is getting 5th minimum salary
   f. Retrieve total number of employees in each department in Bangalore location
   g. Retrieve total number of employees in each location
   h. Retrieve total number of employees in each location in Accounts department
   i. Retrieve total number of employees who complete more than 10 years in each department
6. Write a PL/SQL Procedure to find prime number from 1 to n, n is a user input or parameter
7. Write a PL/SQL Functions to return number of days an employee working using EmpId
8. Write a PL/SQL Procedure to find sum of salaries of all employee working in a particular location
9. Write a PL/SQL Function to return sum of sales by ProdId
10. Write a PL/SQL Function to return sum of sales by EmpId

11. Write a PL/SQL Procedure to generate Employee Report department wise as follows

    DeptName

    EmpName Job Location Salary Cumulative_Salary

12. Write a PL/SQL Trigger to insert row into OldEmployee table when a employee deleted from Employee table (Create OldEmployee table)
13. Write a PL/SQL Trigger not to delete more than 2 employees at a time
14. Write a PL/SQL Trigger not to update employee salary if it cross 67000
15. Write a PL/SQL Package with following procedures and functions
    a. Procedures
        i. Print Total Quantity Sales Summary Report(SalesId, Date, Quantity and Total Quantity)
        ii. Print Total Quantity Sales Summary Report by Date wise
    b. Functions
        i. Return employee name who made maximum sales till date
        ii. Return product name soled maximum quantity till date

Semester III **BCA (Specialization in AI)**

BCAI-402: Python Programming

L=0, T=0, P=2, C=1

MM 100

List of experiments:

1. Write a python code to find given number is prime or not
2. Write a python code to find LCM and GCM of a given list
3. Write a python code to find mean and standard deviation of a given list of numbers
4. Write a python code to add and delete element from a dictionary using functions
5. Write a python code to print 10 student details using class and lists
6. Write a python code to find student from a given list using class
7. Write a python code to inherit employee class to student class
8. Write a python code to build simple GUI calculator
9. Write a python code to build web page with student registration form
10. Write a python code to build web pages with sign-in and sing-up forms
11. Write a python code to build Rest api for product
12. Write a python code to build Ajax enabled web application for product

BCAI-304: Business Communication & Presentation Skills

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To train students in how to be effective communicators by practicing various skills and also help those in becoming well-groomed individuals in terms of both verbal and non-verbal communication.

Unit I:

Principles of Effective written communication

7 C's of Business communication: Clarity, Completeness, Conciseness, Consideration, Courtesy, Correctness, and Concreteness. Practice sessions for business writing.

Unit II:

Letter writing

Structure & Planning, Types of Letter: Leave letter, Cover Letter, Application Letter.
Persuasive Writing: AIDA; practice sessions on letter writing.

Unit III:

Email & Memo writing

Importance of Email & Memo writing in the business world, Format of Email & Memo, Structure of Email & Memo, practice sessions on email and memo writing

Unit IV:

Precise Writing & Report Writing

Techniques of Precise writing, qualities of a good precise. Different types of Report – sales report, Annual report, Technical report, Components of a good report focusing on how to write short reports, practice sessions on report writing

Unit V:

Resume writing

Components of a good resume, different formats of resume, resume writing practice

Conducting Effective Meetings

Different Types of meetings: Business meetings, Review meetings, Preparation for the meeting – Writing Agenda, MOM.

Presentation Skills

Planning & developing effective Presentation, Do's & don'ts of a good presentation, use of Effective visual aids in a presentation

Text Book:

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.
2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.

Reference Books:

1. Shirley Taylor, Communication for Business, Pearson Education.
2. Lesiicar and Flatley, Basic Business Communication, Tata McGraw-Hill.
3. Courtan L. Bovee et al., Business Communication Today, Pearson Education.
4. Meenakshi Raman & Prakash Singh, Business communication, Oxford University Press

Course Outcome*:*

- Students will be able to overcome nervousness and stage fear at the end of the course.

Semester III **BCA (Specialization in AI)**

BCAI-305: Summer Project Seminar I

L=0, T=0, P=2, C=1 **MM 100**

Course Objective*:*

The objective of Summer Project is to enable the student to take up investigative study in field of Computer application with emphasis on their specialization. This is expected to provide a good initiation for the student(s) in Industry practices. The students are expected to investigate, model and present their work either individually or in groups (to be decided by the department) to the departmental committee.

Syllabus
Semester – IV

Semester IV **BCA (Specialization in AI)**

BCAIAI-401: Introduction to RPA Tools

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To understand the basics of RPA tools used in the industry.
- To understand what RPA process.
- To understand UI and tool windows.
- To understand the packages installed for automatic specific targets.
- To have practical knowledge on designing RPA solutions.

Unit I: Robotic Process Automation concepts:

Introduction to RPA: Scopes and techniques of RPA, About UAIth, The future of automation

Record and Play: Record and Play, UAIth stack, Installing and Learning UAIth studio, Task recorder

Unit II: Sequence and Data Manipulation

Sequence: Sequence, Flowchart and Control Flow, sequencing the workflow, control flow, various types of loops and decision making, step by step example using sequence, Flowchart and Control Flow.

Data Manipulation: Variables and scope, Collections, Arguments, Collections, Clipboard management, File operation, CSV/Excel to data table and vice versa

Unit III: Overview of RPA Tools

User Interface Components:

Ribbon, Toolbars Access, Library panel, project panel, Outline panel, locals panel, Debugging, Recording, Workflow execution, context menu, properties panel, Designer panel, Universal search bar.

Workflow Design and UAIth Studio:

Layout diagrams, Type of Decisions, switch activity, Flow Decision, Flow switch, Naming conventions, managing variables in studio, types of variables, Managing arguments, Argument panel, Types of recording, Automatic recording, Basic, web and desktop automatic recording, Manual recording, Data scraping, Screen scrapping and its methods.

Unit IV: Control Flow Activities and Selectors:

Assign activity, Delay activity, While activity, Do while activity, If activity, Switch activity, for each activity and Break activity.

Selectors and input/output methods:

Simple selectors, Generation of Dynamic selectors, passing the variables in selectors, Input methods, Output methods, Full text, Native, OCR.

Unit V: Automation

Excel and PDF Automation:

Reading and working with rows of excel, Looping with excel, Working with PDF and excel files, retrieving data from web.

Email Automation:

Outlook Email activity, Get IMAP mail activity, Get POP3 mail message, get exchange mail activity, sending and receiving mail messages.

Orchestrator:

Dashboard, Robots, Processes, Jobs, Queues, Schedules, Transaction

Text Books:

1. Learning Robotic Process Automation with UAIth – Alok Mani TrAIthi, Packt.
2. Intelligenct Control: A stochastic optimization approach by Kaushik Das Sharma, Amitava Chatterjee, Anjan Rakshit. –Springer edition

Reference Books:

1. Robotic Process Automation- Guide to building robots by Richard Murdoch.
2. Robotic Process Automation and Risk Mitigation: The Definitive Guide by Mary C. Lacity and Dr. Leslie P. Willcocks
3. Introduction to robotic process automation by Frank Casale.

Course Outcome:

At the end of the course, students will be able to:

- Analyze technical goals and tradeoffs.
- Know the importance of RPA tools.
- Envision a basic RPA implementation plan.
- Understand the challenges and risks when implementing RPA.
- Appreciate knowledge on automation and optimization of business process.

Semester IV **BCA (Specialization in AI)**

BCAIAI-402: Introduction to Artificial Intelligence

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To understand the basics of Artificial Intelligence used in the industry.
- To understand what is process automation.
- To understand UI and tool windows.
- To understand the packages installed for automatic specific targets.
- To have practical knowledge on designing automated solutions.

Unit I: Cognitive Process Automation concepts:

Introduction to CPA: Scopes and techniques of CPA, CPA features, CPA platform overview, The future of intelligent automation.

Exploration of the tool: UAIth architecture, Installing and Learning UAIth studio, UAIth operating model, Database installation.

Unit II: Automation in UAIth

UAIth: Working with different stages, Calculation, Decision, Choice, Collection, Loop, Anchor, Understanding Business objects, Understanding UAIth processes, Pages, Multi Page and page linking, Input, Output and Startup Parameters.

End to End Automation: Creating and Managing Business objects in object studio, Creating and Managing UAIth processes in process studio, CSV/Excel to data table transfer and vice versa.

Unit III: UAIth Life Cycle and their artifacts

User Interface Components:

Ribbon, Toolbars Access, Library panel, project panel, Outline panel, locals panel, Debugging, Recording, Workflow execution, context menu, properties panel, Designer panel, Universal search bar.

UI Automation and System Activities: UI automation, System, Properties, Variables, Output and Arguments.

Unit IV: Natural Language Processing:

Text Analysis, Text Cleaning, Stemming, TDM and DTM, Sentiment Analysis, NLP API consumption, Build your own social media monitoring tool and Analysis of Email.

Chatbot: Handling user events and assistant Bots, Monitoring system event triggers, Hotkey triggers, Mouse triggers, System triggers, Launching an assistant bot on a keyboard event.

Unit V: Image and Text Automation:

Image Automation:

Mouse and keyboard activitites, Guides/text activities, OCR- activities, Types of OCR, Image Activities, Computer Vision, Image classification, Unstructured data to structure conversion, Invoice data extraction.

Text Automation:

Exception Handling, Logging, Debugging, Tracing, Connecting with Database, Executing Query with Database, Project Organization, PDF-data extraction and automation, Email automation.

Text Books:

1. Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation by Mr Srikanth Merianda.

2. Intelligenct Control: A stochastic optimization approach by Kaushik Das Sharma, Amitava Chatterjee, Anjan Rakshit. –Springer edition.

3. Learning Robotic Process Automation by Alok Mani TrAIthi.

Reference Books:

1. Robotic Process Automation- Guide to building robots by Richard Murdoch.
2. Robotic Process Automation and Risk Mitigation: The Definitive Guide by Mary C. Lacity and Dr. Leslie P. Willcocks
3. Introduction to robotic process automation by Frank Casale

Course Outcome:

At the end of the course, students will be able to:

- Analyze technical goals and tradeoffs.
- Know the importance of automation tools.
- Envision a basic implementation plan.
- Understand the challenges and risks when implementing automation techniques.
- Appreciate knowledge on automation and optimization of business process through AI.

Semester IV **BCA (Specialization in AI)**

BCAIAI-403: Sensor Technology

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To discuss units, standards, error analysis and characteristics of measurement systems.
- To understand the static and dynamic characteristics of transducers.
- To describe the principle of operation, construction, and characteristics of resistance, inductance and capacitance & other transducers
- .To demonstrate the various types of basic transducers.
- To understand applications of Sensors in Real time applications.

Unit I: Science of Measurement and Instrumentation

Functional Elements of Measurement Systems. Definition, principles of sensing and transduction, Classification of transducers, Units and standards, Classification of errors Odds and uncertainty - Introduction to Calibration methods.

Unit II: Resistive Transducers

The principle of operation, construction details, characteristics and application of resistance potentiometer, strain gauge and its signal conditioning circuits, RTD, LDR, thermistor, hot-wire anemometer and humidity sensor. Demonstration of RTD, Strain gauge, LDR

Unit III: Inductive and Capacitive Transducers

Induction potentiometer - Variable reluctance transducers, LVDT - Variable reluctance Tachometer, Proximity transducers - Capacitive transducer and types - Capacitor microphone

Unit IV: Other Transducers

A piezoelectric transducer, magnetostrictive transducer - Digital transducers - Fiber optic transducer - Hall Effect transducer - Photo electric transducer- I/P & P/I transducer. Introduction to Smart sensors and MEMS. Points to be considered for selecting a transducer.

Unit V: Sensor Applications

Typical applications of sensors, Sensors in Real time industry, Selection criterial of the sensor as per the application, Application Cases: Weather monitoring system, Water monitoring system, Sensor on the Conveyor system.

Text Book:

1. E.A. Doebelin, "**Measurement Systems – Applications and Design**", Tata Mc Graw Hill, New York, 2012
2. John P. Bentley, "**Principles of Measurement Systems**", 4th Edition, Pearson Education, 2005
3. S. Ranganathan, "**Transducer Engineering**", Allied Publishers Pvt. Ltd.,2003

Reference Book:

1. . D.Patranabis, "**Sensors and Transducers**", Prentice Hall of India, 2004.

Course Outcome:

Students can,

- What are the sensors and how they works in different applications
- Classification of sensors
- How to select the sensor for specific application.
- Real time integration of sensors with signal conditioning systems.

Semester IV **BCA (Specialization in AI)**

BCAIAI-404: Business Process Management

L=3, T=0, P=0, C=3 **MM 100**

Course Objective*:*

- Understand the business process methodology and its phases for the implementation
- Understand the basics of Business process management life cycle.
- Understand the business process management workflow and its methods.
- Understand the architecture and important properties of business process management.

Unit I: Introduction to Business Process Management

Introduction, definition, business process life cycle, classification of business process, goals, structures and organization, evolution of enterprise systems architecture, business process modelling foundation: Conceptual Model and Terminology, Activity Models and Activity Instances, Process Models and Process Instances, Process Interactions, Modelling Process Data, modelling organization and operations, business process flexibility.

Unit II: Process Orchestrations and Choreographies

Introduction, Control Flow Patterns, Petri Nets, Event-driven Process Chains, Workflow Nets, Yet Another and Graph Based Workflow Language, Business Process Modeling Notation, Development Phases, Process Choreography Design and implementation, service interaction patterns.

Unit III: Properties and Architecture of Business Process Management

Introduction, Data Dependencies, Structural Soundness, Soundness, Relaxed Soundness, Weak Soundness, Lazy Soundness, Workflow Management Architectures, Flexible Workflow Management, Web Services and their Composition, Advanced Service Composition.

Unit IV: Business Process Methodology – I

Introduction, Methodology Overview, Strategy and Organization, Survey, Design Phase, Platform Selection, Implementation and Testing, Operation and Controlling Phase.

Unit V : Business Process Methodology - II

Business Process Reengineering, Business Process Management (BPM) Implementation Methodology, Phases for Implementation: Commit, Research, Analyze, Design and Implement and Support.

Text Books:

1. Business Process Management - Concepts, Languages, Architectures by Mathias Weske, Springer, 2007.
2. BUSINESS PROCESS MANAGEMENT SYSTEMS by James F. Chang, Auerbach Publications, 2006.

Reference Books:

1. Business Process Management Practical Guidelines to Successful Implementations by John Jeston and Johan Nelis, Butterworth-Heinemann is an imprint of Elsevier, 2008
2. BUSINESS PROCESS MANAGEMENT APPLIED by Charles Poirier Ian Walker, J.Ross Publishing Inc, 2005

Course Outcome:

Students can,

- Explain about the life cycle of business process management and its components.
- Draw a workflow for the business process management with different methods.
- Create and explain about the architecture of business process management.
- Create and implement the architecture of business process management.

Semester IV **BCA (Specialization in AI)**

Elective-II

BCAIAI-405: Introduction to Data Science

L=3, T=0, P=0, C=3 **MM 100**

Course objectives:

- To understand the overview and definition of Data Science with its crucial role in current business world.
- To understand the importance of mathematics & Statistics in Data Science.
- To understand the role of machine learning techniques in Data Science and its different types.
- To know the integrated role of computers and its components in Data Science
- To understand the flow and process model of data science project management.

Unit I: Data Science - An Overview

Introduction to Data Science, Definition and description, history and development, terminologies, basic framework and architecture, difference between Data Science and business analytics, importance of Data Science, primary components of Data Science, users of Data Science and its hierarchy, overview of Data Science techniques, challenges and opportunities in Data Science, industrial application of Data Science techniques.

Unit II: Mathematics and Statistics in Data Science

Role of mathematics, importance of probability and statistics, important types of statistical measures : Descriptive, Predictive and prescriptive statistics, introduction to statistical inference, application of statistical techniques, linear algebra : matrix and vector theory, role of linear algebra in Data Science, exploratory data analysis and visualization techniques, difference between exploratory and descriptive statistics.

Unit III: Machine Learning in Data Science

Role of machine learning, different types of machine learning techniques and its broad scope: Supervised, unsupervised, reinforcement and deep learning, difference between different machine learning techniques, machine learning algorithms, importance of machine learning in today's business, difference between classification and prediction.

Unit IV: Computers in Data Science

Role of computer science in Data Science, various components of computer science being used for Data Science, role of relation data base systems: SQL, NoSQL, data warehousing, importance of operating concepts and memory management, freely available software tools: R, Python, important proprietary software tools, business intelligence tools.

Unit V: Data Science Project Management

Data Science project framework, execution flow of a Data Science project, various components of Data Science projects, stakeholders of Data Science project, industry use cases of Data Science implementation, challenges and scope of Data Science project management, process evaluation model, comparison of Data Science project methods, improvement in success of Data Science project models.

Text Books:

1. Data Science from Scratch: First Principles with Python 1st Edition by Joel Grus
2. Principles of Data Science by Sinan Ozdemir, (2016) PACKT.

Reference Book:

1. Data Science For Dummies by Lillian Pierson (2015)
2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking by Foster Provost, Tom Fawcett
3. Data Smart: Using Data Science to Transform Information into Insight 1st Edition by John W. Foreman. (2015) Wiley Publication.

Course Outcome:

Students can,

- After completing this course, students will be able to appreciate the need of Data Science in day to day life.
- They will be able to understand the process and components of Data Science project.
- Student will the Learn importance of probability and statistics in Data Science
- Student will be able to understand the machine learning in today's business world.
- Understands the various components of computer science being used for Data Science
- Student will bale to understand the execution flow of a Data Science project

Semester IV **BCA (Specialization in AI)**

Elective-II

BCAIAI-406: Pattern Recognition

L=3, T=0, P=0, C=3 **MM 100**

Course Objective:

- To provide a strong foundation to students to learn the fundamentals of Pattern Recognition techniques.
- To understand Parameter Estimation and Supervised Learning methods.
- To understand kernel methods used in pattern classification models.
- To understand Discriminant Functions and Syntactic Approach to Pattern Recognition. To understand the concept of basic tree models and applications in pattern recognition

Unit I: Introduction to Pattern Recognition Systems

The Design Cycle-Learning And Adaptation-Supervised Learning- Unsupervised Learning-Reinforcement Learning-Linear Model For Classification-Discriminant Function(Two Class And Multiclass)-Least Square For Classification- Fisher's Linear Discriminant Analysis For Two And Multiple Class- Probabilistic Generative Models – Maximum Likelihood Solution.

Unit II: Parameter Estimation and Supervised Learning

Maximum Likelihood Estimation - The Bayes Classifier - Learning The Mean Of A Normal Density - General Bayesian Learning - Nonparametric Technic – Density Estimation - Parzen Windows - K-Nearest Neighbor Estimation - Estimation Of Posterior Probabilities - Nearest-Neighbor Rule - K-Nearest Neighbor Rule.

Unit III: Kernel Methods

Constructing Kernels – Kernel Density Estimators - Nearest Neighbor Methods – Gaussian Processes And Classification – Sparse Kernel Machines - Support Vector Machines – Maximum Margin Classifiers - Multi-Class Support Vector Machine. Graphical Models: Bayesian Networks - Generative Models - Linear Gaussian Models - Conditional Independence.

Unit IV: Gaussian Mixture Models and Expectation Maximization

K-Means Clustering - Mixtures Of Gaussian -Expectation Maximum For Gaussian Mixtures. Continuous Latent Variables: PrincAIl Component Analysis -Applications Of PrincAIl Component Analysis -PCA For Higher Dimensional Data - Factor Analysis. Sequential Data: Markov Models – Hidden Markov Models - Maximum Likelihood For HMM–Forward-Backward Algorithm. Combining Models.

Unit V: Tree Based Models

Tree based model- Pros and Cons, decision tree algorithms, classification tree, characteristics of classification tree, induction algorithms, probability estimation in decision tree – Laplace correction and no match method, stopping criteria for tree development, pruning techniques and pruned tree.

Classification Methods: Information Gain: ID3-C4.5-C5-J 48. Gini Index: SPRINT-SLIQ. Decision Tree Advantages and Disadvantages-Application of decision tree- Classification and Regression Trees (CART).

Text Books:

1. "Pattern Recognition And Machine Learning",. Christopher M. Bishop , Springer, 2006
2. "Pattern Classification", Second Edition, Richard O. Duda, Peter E. Hart And David G. Stork John Wiley & Sons, 2003

Reference Books:

1. Syntactic Pattern Recognition And Applications, Fu K.S., Prentice Hall, Eaglewood Cliffs
2. Pattern Recognition: Techniques And Applications by RajjanShinghal : Oxford University Press, 2008,
3. Pattern Classification And Scene Analysis, John Wiley, Duda& Hart P.E.
4. Syntactic Pattern Recognition - An Introduction by Addison Wesley Gonzalez R.C. & Thomson M.G.

Course Outcome:

- Understand the basic concept of ML and also the applications of ML.
- To understand Parameter Estimation and Supervised Learning methods.
- Understand the concept of kernel methods and how it works in Support vector machines.
- To understand Discriminant Functions and Syntactic Approach to Pattern Recognition.
- Understand concept of basic tree models along with its applications

Semester IV **BCA (Specialization in AI)**

BCAIAI-407: Introduction to Artificial Intelligence Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

1. Write a script for a bot to analyze the text from a given source.
2. Convert all the unstructured images to structured images used for classification.
3. Connect a bot to an API to analyze the sentiment of the different text messages.
4. Connect a bot to an API to summarize the input text.
5. Build a process to classify images based on their nominal data.
6. Build a process to fill the different invoice data.
7. Write a python code to build Ajax enabled web application for product.

Semester IV **BCA (Specialization in AI)**

BCAIAI-408: Introduction to RPA Tools Lab

L=0, T=0, P=4, C=2 **MM 100**

List of Experiments:

Part A:

1. Read and write the data and append it to excel
2. Prepare a process of sending and receiving mail with/without attachment
3. Fill the data to collection or to extract form SQL database.

Part B:

1. Write the script to an agent in order to login for the setup created.
2. Write a script to extract the information form Email and to analyze the same.
3. Setup a workflow scheduler to manage work queues management

Semester IV **BCA (Specialization in AI)**

BCAIAI-403: Logical Reasoning and Thinking

L=0, T=0, P=4, C=2 **MM 100**

Course Objective*:*

- To help students learn the techniques of enhancing and sharpening their aptitude skills related to verbal ability, quantitative aptitude, logical reasoning and data presentation.

Unit I: Verbal ability

Synonyms**,** Antonyms and One word substitutes

Unit II: Basic quantitative aptitude

Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications.

Unit III: Logical Reasoning - I

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data

Unit IV: Measures of Central Tendency

Objective of averaging, characteristics of good average, types of average, arithmetic mean of grouped and ungrouped data, correcting incorrect values, weighted arithmetic mean
Median - median of grouped and ungrouped data merit and limitation of median, computation of quartile, decile and percentile
Mode - calculation of mode of grouped and ungrouped data, merits and limitation of mode, relationship between mean, median and mode. Geometric mean and Harmonic mean.

Unit V: Presentation of Data

Construction of tables with one or more factors of classification; Diagrammatic and Graphical representation of non-frequency data; Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Data Interpretation – Introduction and approaches

Text Books:

1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, NewDelhi, 5th Ed. 2007
2. Bajpai, N. Business Statistics, Pearson, 2010.

Reference Books:

1. Sharma J.K., Business Statistics, Pearson Education India, 2010.
2. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, West Publishing Company, 1996.
3. CAT Complete course, UPKAR publications.

Course Outcome:

- By the end of this course, students will be able to use their logical reasoning and thinking skills more effectively; hence making them ready to clear written aptitude tests in industries and get placed easily.