



Your Dreams Our Goal

POORNIMA UNIVERSITY

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

FACULTY OF COMPUTER SCIENCE & ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & APPLICATION



SCHEME & SYLLABUS BOOKLET

BCA BATCH 2022-2025

SCHEME & SYLLABUS

BATCH: 2022-25

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Disclaimer: The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

Student Details

Name of Student:

Name of Program:

Semester:

Year:

Batch:

Faculty of:



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UNIVERSITY

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VISION

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

Mission

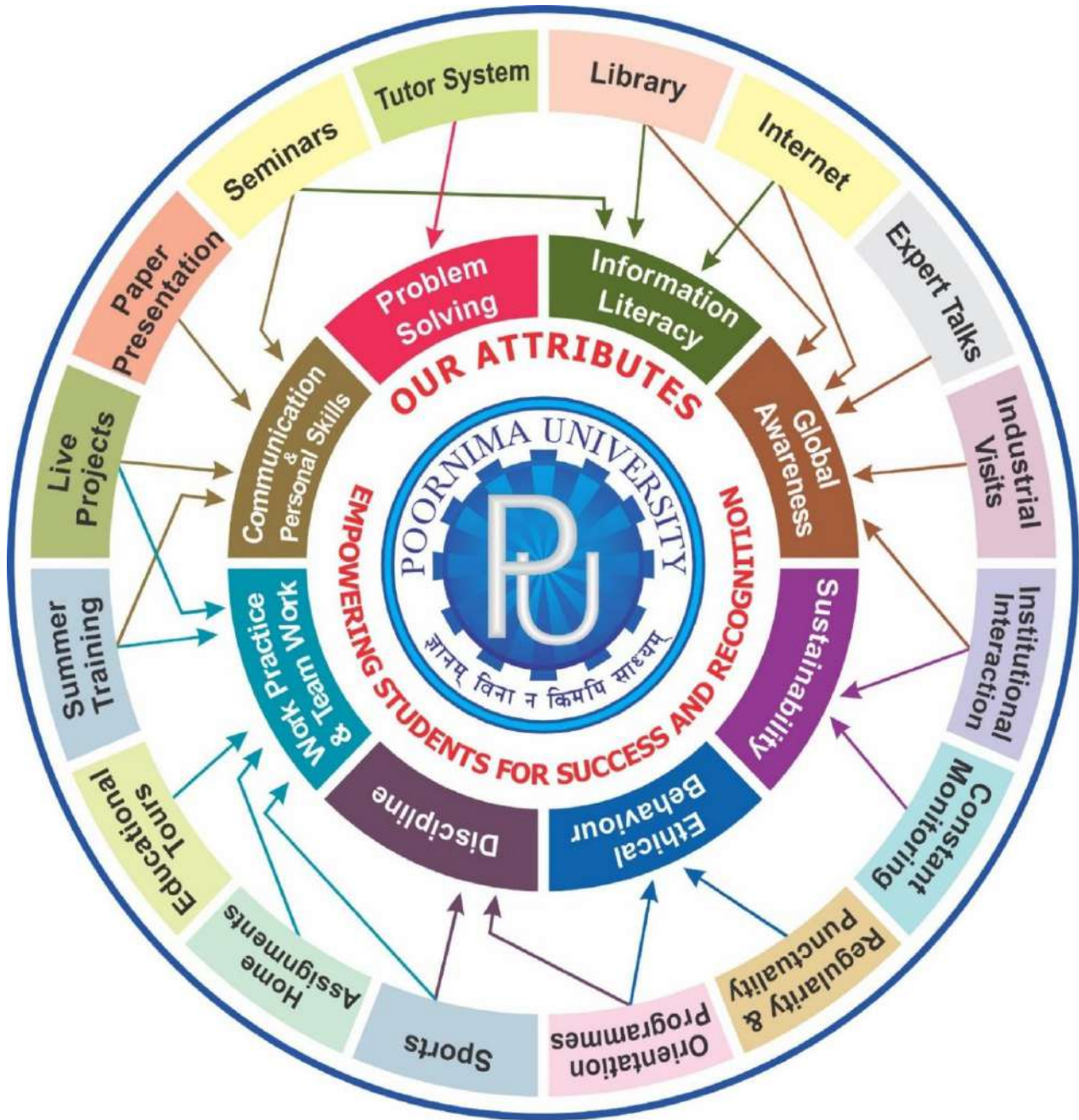
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied.

Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



About Program and Program Outcomes (PO):

Title of the Programme: Bachelor of Computer Applications (BCA)

Nature of the Programme: BCA is three-year full-time programme.

Program Outcomes (PO) :

Graduates will be able to:

PO1: Computational information: Appreciate and apply mathematical organization, computing and domain information for the conceptualization of computing models from clear harms.

PO2: Difficulty Analysis: Talent to classify, significantly evaluate and prepare complex computing problems using fundamentals of computer knowledge and request domains.

PO3: Drawing / Improvement of Solutions: Facility to transform composite production scenarios and present-day issues into problems, explore, recognize and propose included solutions using rising technologies.

PO4: Accomplish Investigations of Compound Computing Troubles: Ability to invent and ways experiments interpret data and present well up to date conclusions.

PO5: Current Implement Procedure: Skill to select recent computing tools, skills and techniques compulsory for original software solutions

PO6: Proficient Principles: Facility to apply and give expert principles and cyber systems in a universal monetary situation.

PO7: Ultimate Education: Identify the need for and enlarge the ability to appoint in permanent education as a Computing qualified.

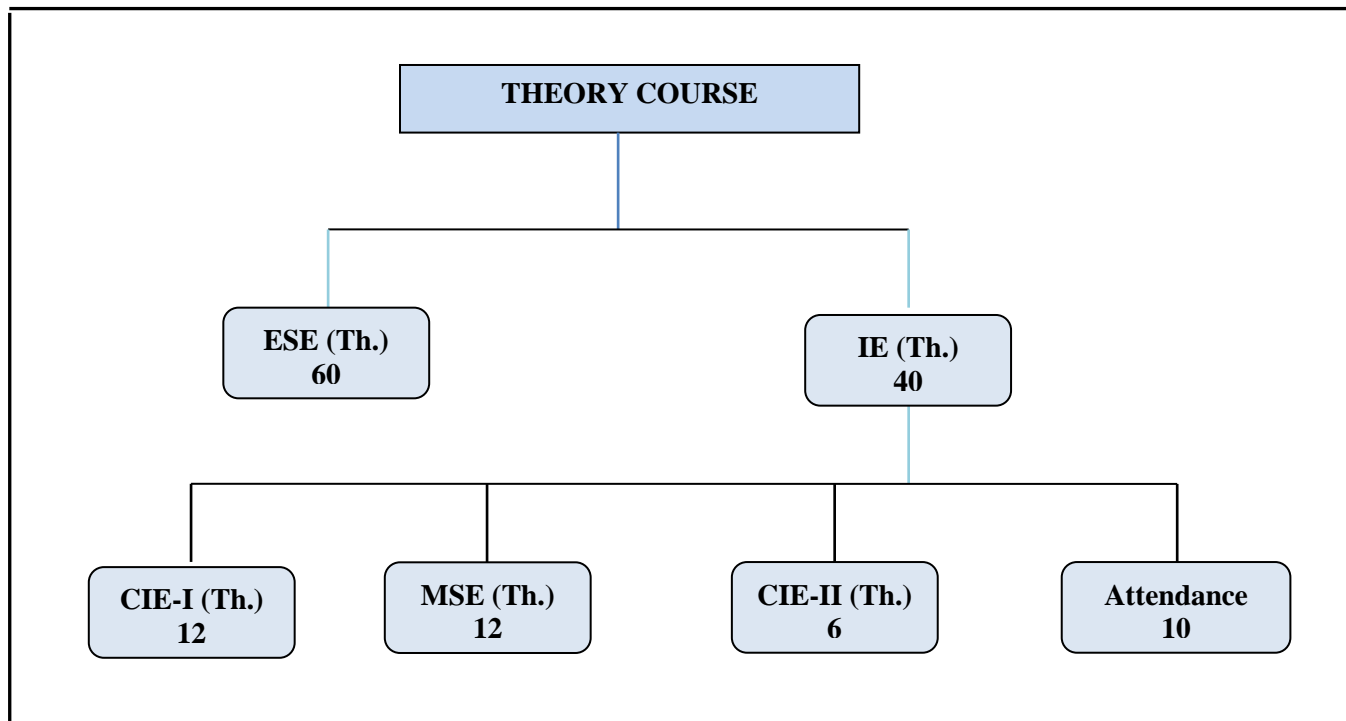
PO8: Individual and team work: Ability to job as a part or manager in various teams in multidisciplinary situations.

PO9: Communication: being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

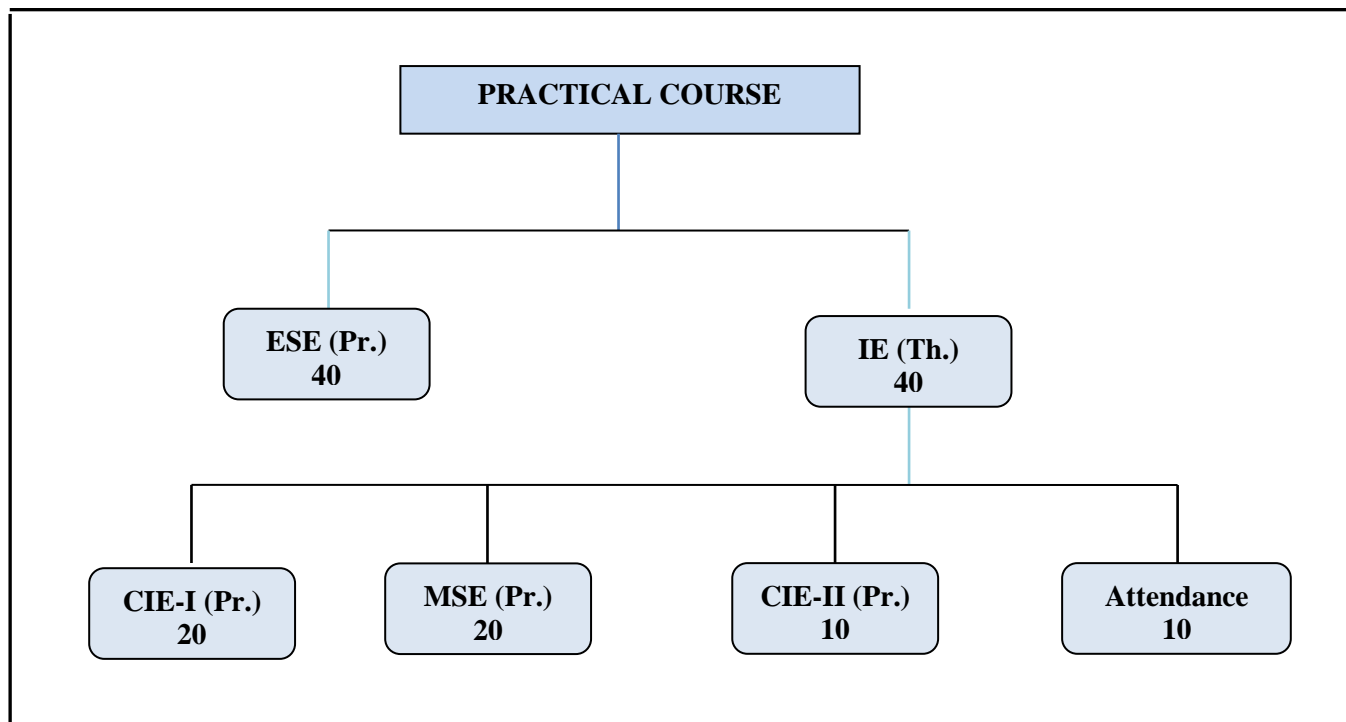
PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Examination System:

A. Marks Distribution of Theory Course:



B. Marks Distribution of Practical Course :



Th. : Theory, **Pr.** : Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

Marks Distribution of Attendance:

Guidelines for Marks Distribution of Attendance Component		
S No.	Total Course Attendance (TCA) range in Percentage	Marks allotted (out of 10)
1	$95\% \leq \text{TCA}$	10
2	$90\% \leq \text{TCA} < 95\%$	9
3	$85\% \leq \text{TCA} < 90\%$	8
4	$80\% \leq \text{TCA} < 85\%$	7
5	$70\% \leq \text{TCA} < 80\%$	6
6	$60\% \leq \text{TCA} < 70\%$	5
7	$50\% \leq \text{TCA} < 60\%$	4
8	$40\% \leq \text{TCA} < 50\%$	3
9	$30\% \leq \text{TCA} < 40\%$	2
10	$20\% \leq \text{TCA} < 30\%$	1
11	$\text{TCA} < 20\%$	0

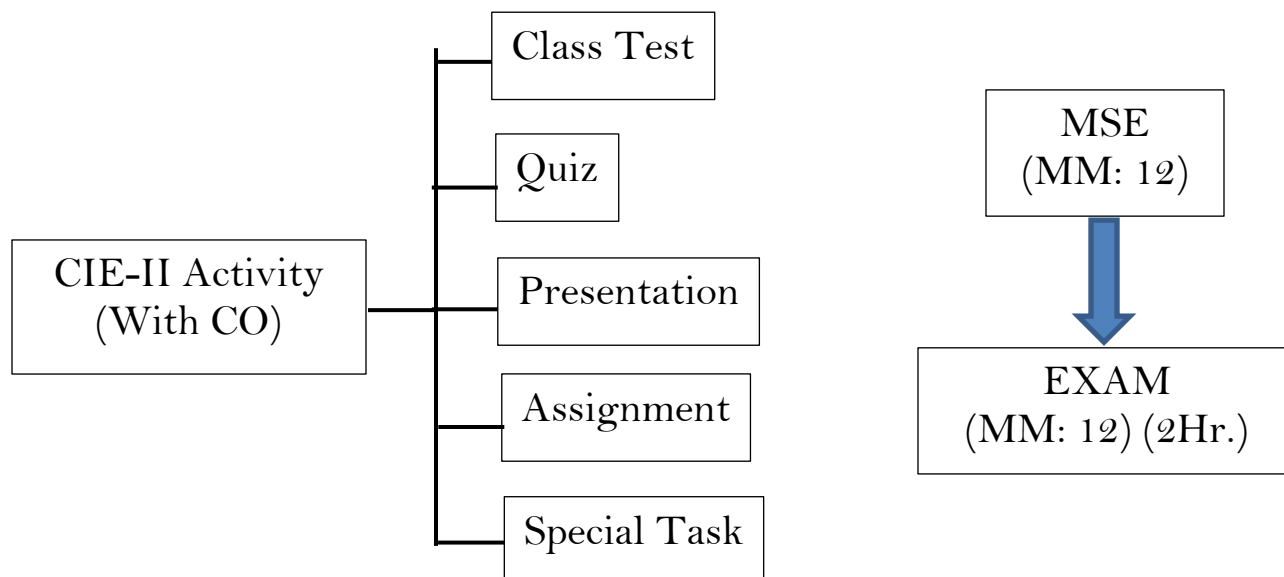
CO Wise Marks Distribution:

	Theory Subject		Practical/ Studio Subject	
	Maximum Marks	CO to be Covered	CO to be Covered	Maximum Marks
CIE-I (Class Test)	12 (6 + 6)	1 & 2	1 & 2	20 (10 + 10)
MSE	12 (6 + 6)	3 & 4	3 & 4	20 (10 + 10)
CIE-II (Activity/ Assignment)	6 (6)	5	5	10 (10)
Attendance	10	-	-	10
ESE	60	-	-	40
TOTAL	100	-	-	100

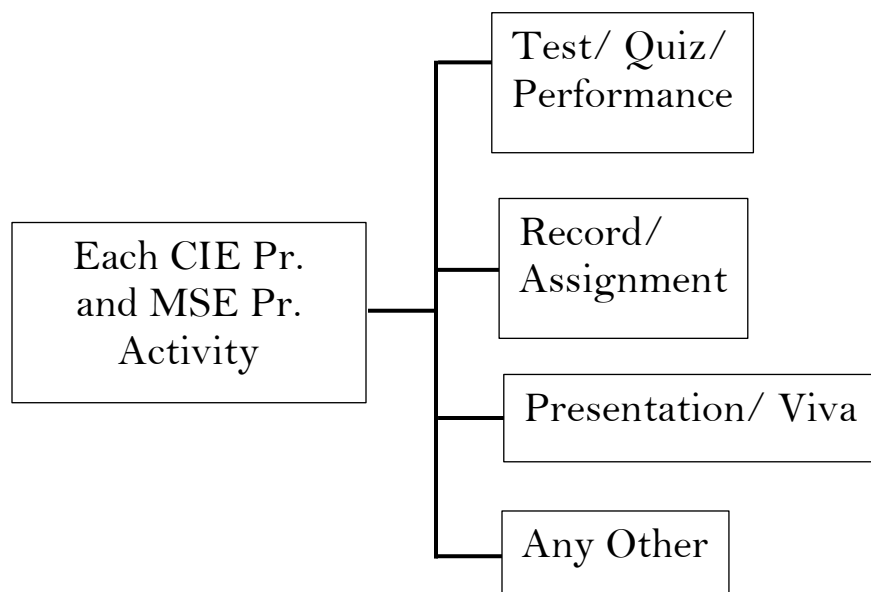
Minimum Passing Percentage in All Exams:

S. No.	Program	Minimum Passing Percentage in All Exam	
		ESE Component	Total Component
1	Course Work for Ph. D Registration	-----	50 %
2	B. Arch.	45 %	50 %
3	MBA, MHA, MPH, MCA, M. Tech., M. Plan. and M. Des.	40 %	40 %
4	B. Tech., B. Des., BCA, B.Sc., BVA, B. Voc., BBA, B.Com., B.A. and Diploma	35 %	40 %
5	B. Sc. (Hospitality & Hotel Administration)	35 %	40 % (Theory) & 50 % (Practical)

Break-up of Internal Exam (Theory):



Break-up of Internal Exam (Practical):



Assessment & Grade Point Average: SGPA, CGPA:

SGPA Calculation

$$SGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

$SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$	<p>Where (as per teaching Scheme & Syllabus) :</p> <p>C_i is the number of Credits of Courses i,</p> <p>G_i is the Grade Point for the Course i and i = 1, 2,.....n</p> <p>n = number of courses in a programme in the Semester</p>
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CGPA Calculation

$$CGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

$CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$	<p>Where (as per teaching Scheme & Syllabus) :</p> <p>C_i is the number of Credits of Courses i,</p> <p>G_i is the Grade Point for the Course i and i = 1, 2,.....n</p> <p>n = number of courses in a programme of all the Semester up to which CGPA is computed.</p>
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Grading Table:

Grading Table-A: For B.Arch. and course work for Ph.D. Registration

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	A+	10	$90 \leq x \leq 100$
Excellent	A	9	$80 \leq x < 90$
Very good	B+	8	$70 \leq x < 80$
Good	B	7	$60 \leq x < 70$
Average	C	6	$50 \leq x < 60$
Fail	F	0	$x < 50$

Grading Table-B: For all courses except B.Arch. and course work for Ph.D. Registration

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	A+	10	$90 \leq x \leq 100$
Excellent	A	9	$80 \leq x < 90$
Very good	B+	8	$70 \leq x < 80$
Good	B	7	$60 \leq x < 70$
Average	C	6	$50 \leq x < 60$
Satisfactory	D	5	$40 \leq x < 50$
Fail	F	0	$x < 40$

Calculation of SGPA

$$SGPA = \frac{\sum C_i \times G_i}{\sum C_i}$$

$$SGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

Calculation of CGPA

$$CGPA = \frac{\sum C_i \times G_i}{\sum C_i}$$

$$CGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

where (as per teaching scheme & syllabus): C_i is the number of credits of subject i , G_i is the Grade Point for the subject i and $i = 1$ to n , n = number of subjects in a course in the semester

Award of Class:

CGPA	Equivalent Division
$7.50 \leq CGPA$	First Division with Distinction
$6.50 \leq CGPA < 7.50$	First Division
$5.50 \leq CGPA < 6.50$	Second Division
$4.50 \leq CGPA < 5.50$	Pass Class

The multiplication factor for conversion of CGPA to percentage is Equivalent % of Marks = $(CGPA - 0.5) \times 10$.

For Example if CGPA = 5.5 then % is $(5.5 - 0.5) \times 10 = 50\%$.

Guidelines for MOOC COURSES:

1. Applicable from the session 2020 – 21 onwards, for students aspiring for HONOURS Degree.
2. The UGC has issued UGC (Credit Framework for Online Learning Courses) Regulation, 2016. These shall apply to all universities established or incorporated by or under a Central Act, a Provincial Act, or a State/Union Territory Act and all institutions recognized by or affiliated to such Universities and all institutions deemed to be universities under Section 3 of the UGC Act, 1956.
3. All India Council for Technical Education (AICTE) has introduced Model Curriculum for Bachelor programs of 4 years/ 3 Years, and additional credits will be required to be done for the degree of Bachelor program with Honours. These additional credits will have to be acquired with online courses (MOOCs) as per AICTE.
4. This creates an excellent opportunity for students to acquire the necessary skill set for employability through massive online courses where the rare expertise of world famous experts from academics and industry are available.
5. Students are required to complete additional credits through MOOCs within 4 years/ 3years of time (whatever be applicable time for the completion of registered program) so as to become eligible for Honours degree as per norms.
6. It is necessary to complete minimum MOOCs credit course as mentioned below for becoming eligible for the Honours degree in the registered program.
7. MOOC Course Credits shall be calculated as per details given below:
8. Student are required to give the prior information about MOOCs courses to his respective HOD and COE, in which he/she wants to register for online certification.
9. After getting permission from respective HOD, a student can register for the MOOC certification courses.
10. After successful completion of the said MOOC course, the student shall submit the certificate of completion to the respective department. If he/ she fails to provide the certificates of MOOC courses before last teaching day of the semester then these certificates will not be considered later.

Required credits for Honours :

S.No	Program Duration	Required credits for Honours
1.	2- Year	10- Credits
2.	3- Year	15- Credits
3.	4-Year	20- Credits

S. No	NPTEL/ SWAYAM Course duration (in weeks)	Equivalent Credits
1	4	2
2	8	3
3	12	4

Attached Items:

Open Elective Booklet	Annexure-1
Soft Skills Booklet	Annexure-2
Value Added Course Booklet	Annexure-3

Bachelor of Computer Applications

with specialization

Cloud Technology

Scheme

Batch 2022-25

POORNIMA UNIVERSITY								
Faculty of Computer Science and Engineering								
Department of Computer Applications								
Name of Program: BCA (With Specialization in Cloud Technology)								
Teaching Scheme for Year I Semester I							Batch:2022-25	
Course Code	Course Name	Teaching Scheme(Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	University Core Courses							
A.1	Theory							
BULCSA1101	Environmental Studies	2	-	-	40	60	100	2
B.	Department Core Courses							
B.1	Theory							
BCACSA1101	Computer Oriented Numerical & Statistical Method	3		-	40	60	100	3
BCACCA1102	Programming Fundamentals of C	3	-	-	40	60	100	3
BCACCA1103	Web Designing	3	-	-	40	60	100	3
BCACCA1104	Computer Organization and Architecture	3	-	-	40	60	100	3
BCTCCA1105	Fundamentals of Cloud Technology	3	-	-	40	60	100	3
B.2	Practical							
BCACCA1201	Programming Fundamentals of C Lab	-	-	2	60	40	100	1
BCACCA1202	Web Designing Lab	-	-	2	60	40	100	1
BCACCA1203	Office Automation Lab	-	-	2	60	40	100	1
BCACCA1204	Information Technology lab			2	60	40	100	1
C.	Department Elective							
	NIL							
D.	Open Elective							
	NIL							
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)							
BULCHU1201	Foundation English	-	-	2	60	40	100	1
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
	NIL							
G.	Discipline, VAC & Social Outreach							
BCACCA1601	Talent Enrichment Programme (TEP)	-	-	2	50	-	50	1
	Library / MOOC / Online Certificate Courses	-	-	2				
	Non Syllabus Project (NSP) / Industry Visit / CRT	-	-	2				
	Total	17	-	16				
	Total Teaching Hours		33					23

POORNIMA UNIVERSITY								
Faculty of Computer Science and Engineering								
Department of Computer Applications								
Name of Program: BCA (With Specialization in Cloud Technology)								
Teaching Scheme for Year I Semester II							Batch:2022-25	
Course Code	Course Name	Teaching Scheme(Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	University Core Courses							
	NIL							
A.1	Theory							
B.	Department Core Courses							
B.1	Theory							
BCACCA2101	Computer Networks	3		-	40	60	100	3
BCACCA2102	OOPS with Java	3	-	-	40	60	100	3
BCACCA2103	Data Structure and Algorithm	3	-	-	40	60	100	3
BCACCA2104	Operating System	3	-	-	40	60	100	3
BCTCCA2105	Mobile & Wireless Network	3	-	-	40	60	100	3
B.2	Practical							
BCACCA2201	Operating System Lab	-	-	2	60	40	100	1
BCACCA2202	OOPS with Java Lab	-	-	2	60	40	100	1
BCACCA2203	Data Structure and Algorithm Lab	-	-	2	60	40	100	1
BCACCA2204	Computer Network Lab			2	60	40	100	1
C.	Department Elective							
	NIL							
D.	Open Elective	-	-	-				
	As Per Annexure-I	2						2
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)							
BULCHU2201	Language Lab	-	-	2	60	40	100	1
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
	NIL							
G.	Discipline, VAC & Social Outreach							
BCACCA2601	Talent Enrichment Programme (TEP)	-	-	2	50	-	50	1
	Library / MOOC / Online Certificate Courses	-	-	2				
	Non Syllabus Project (NSP) / Industry Visit / CRT	-	-	2				
	Total	17	-	16				
	Total Teaching Hours		33					23

POORNIMA UNIVERSITY								
Faculty of Computer Science and Engineering								
Department of Computer Applications								
Name of Program: BCA (With Specialization in Cloud Technology)								
Teaching Scheme for Year II Semester III							Batch:2022-25	
Course Code	Course Name	Teaching Scheme(Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	University Core Courses							
A.1	Theory	NIL						
B.	Department Core Courses							
B.1	Theory							
BCACCA3101	Relational Database Management System	3		-	40	60	100	3
BCACCA3102	Python Programming	3	-	-	40	60	100	3
BCACCA3103	Linux and Shell Script	3	-	-	40	60	100	3
BCTCCA3104	Principles of Virtualization	3	-	-	40	60	100	3
B.2	Practical							
BCACCA3201	Relational Database Management System Lab	-	-	2	60	40	100	1
BCACCA3202	Python Programming Lab	-	-	2	60	40	100	1
BCACCA3203	Linux and Shell Script Lab			2	60	40	100	1
BCTCCA3204	Principles of Virtualization Lab	-	-	2	60	40	100	1
C.	Department Elective							
BCAECA3111	Digital Marketing	3	-	-	40	60	100	3
BCAECA3112	Software Engineering							
BCAECA3113	Management Information System							
D.	Open Elective	-	-	-				
	As Per Annexure-I	2						2
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)							
BULCHU3201	Communication Skills-I	-	-	2	60	40	100	1
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
	NIL							
G.	Discipline, VAC & Social Outreach							
BCACCA3601	Talent Enrichment Programme (TEP)	-	-	2	50	-	50	1
	Library / MOOC / Online Certificate Courses	-	-	2				
	Non Syllabus Project (NSP) / Industry Visit / CRT	-	-	2				
	Total	17	-	16				
	Total Teaching Hours		33					23

POORNIMA UNIVERSITY								
Faculty of Computer Science and Engineering								
Department of Computer Applications								
Name of Program: BCA (With Specialization in Cloud Technology)								
Teaching Scheme for Year II Semester IV							Batch:2022-25	
Course Code	Course Name	Teaching Scheme(Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	University Core Courses							
A.1	Theory	NIL						
B.	Department Core Courses							
B.1	Theory							
BCACCA4101	Big Data Analysis	3		-	40	60	100	3
BCACCA4102	Design and Analysis of Algorithm	3	-	-	40	60	100	3
BASCCA4103	Cloud Web Services	3	-	-	40	60	100	3
BASCCA4104	Network Administration	3	-	-	40	60	100	3
B.2	Practical							
BCACCA4201	Big Data Lab	-	-	2	60	40	100	1
BCACCA4202	Design and Analysis of Algorithm Lab	-	-	2	60	40	100	1
BCTCCA4203	Cloud Web Services Lab			2	60	40	100	1
BCTCCA4204	Network Administration Lab	-	-	2	60	40	100	1
C.	Department Elective							
BCAECA4111	Information Security Fundamental	3	-	-	40	60	100	3
BCAECA4112	Software Project Management							
BCAECA4113	E-Commerce							
D.	Open Elective	-	-	-				
	As Per Annexure-I	2						2
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)							
BULCHU4201	Communication Skills-II	-	-	2	60	40	100	1
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
BCACCA4401	Industrial Training Seminar-1			2	60	40	100	1
G.	Discipline, VAC & Social Outreach							
BCACCA4601	Talent Enrichment Programme (TEP)	-	-	4	50	-	50	1
	Library / MOOC / Online Certificate Courses	-	-					
	Non Syllabus Project (NSP) / Industry Visit / CRT	-	-					
	Total	17	-	16				
	Total Teaching Hours		33					24

POORNIMA UNIVERSITY								
Faculty of Computer Science and Engineering								
Department of Computer Applications								
Name of Program: BCA (With Specialization in Cloud Technology)								
Teaching Scheme for Year III Semester V							Batch:2022-25	
Course Code	Course Name	Teaching Scheme(Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	University Core Courses							
A.1	Theory	NIL						
B.	Department Core Courses							
B.1	Theory							
BCTCCA5101	Cloud Deployment	3		-	40	60	100	3
BCTCCA5102	Cloud Migration and Data Center	3	-	-	40	60	100	3
BCTCCA5103	Cloud Computing Solution	3	-	-	40	60	100	3
BCTCCA5104	Cryptography and Cloud Security	3	-	-	40	60	100	3
B.2	Practical							
BCTCCA5201	Cloud Deployment Lab	-	-	2	60	40	100	1
BCTCCA5202	Cloud Computing solution Lab	-	-	2	60	40	100	1
BCTCCA5203	Cryptography and Cloud Security Lab			2	60	40	100	1
C.	Department Elective							
BCAECA5111	Advance Cloud Technology	3	-	-	40	60	100	3
BCAECA5112	Advanced Data Structure							
BCAECA5113	Data Mining & Warehousing							
D.	Open Elective	-	-	-				
	As Per Annexure-I	2						2
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)							
BULCHU5201	Human Values & Professional Ethics	-	-	2	60	40	100	1
BULCHM5202	Leadership & Management Skills	-	-	2	60	40	100	1
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
BCACCA5401	Industrial Training Seminar-II			2	60	40	100	1
G.	Discipline, VAC & Social Outreach							
BCACCA5601	Talent Enrichment Programme (TEP)	-	-	4	50	-	50	1
	Library / MOOC / Online Certificate Courses	-	-					
	Non Syllabus Project (NSP) / Industry Visit / CRT	-	-					
	Total	17	-	16				
	Total Teaching Hours		33					24

POORNIMA UNIVERSITY								
Faculty of Computer Science and Engineering								
Department of Computer Applications								
Name of Program: BCA (With Specialization in Cloud Technology)								
Teaching Scheme for Year III Semester VI							Batch:2022-25	
Course Code	Course Name	Teaching Scheme(Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	University Core Courses							
B.	Department Core Courses							
BCACCA6501	Project/Internship	-	-	22	60	40	100	11
C.	Department Elective: Anyone							
	NIL							
D.	Open Elective: Anyone							
	NIL							
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)							
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
	NIL							
G.	Discipline, VAC & Social Outreach							
BCACCA6601	Talent Enrichment Programme (TEP)	-	-	3	50	-	50	1
	Library / MOOC / Online Certificate Courses	-	-	4		-		
	Non Syllabus Project (NSP) / Industry Visit / CRT	-	-	4				
	Total			33				
	Total Teaching Hours	33						12

Semester-I

SEMESTER I

DEPARTMENT CORE COURSES

Code: BULCSA1101

Environmental Studies

2 Credits [LTP: 2-0-0]

COURSE OUTCOME

Students will be able to:

- Explain the concept of ecology, ecosystem and biodiversity.
- Implement innovative ideas of controlling different categories of Environmental Pollution.
- Explain different environmental issues together with various Environmental Acts, regulations and International Agreements.
- Summarize social issues related to population, resettlement and rehabilitation of project affected persons and demonstrate disaster management with special reference to floods, earthquakes, cyclones, landslides.
- Determine the local environmental assets with simple ecosystems and identify local flora and fauna.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Environmental Studies	05
2.	Environmental Pollution and its Controls	05
3.	Environmental Policies & Practices	05
4.	Human Communities and the Environment	05
5.	Field Work	04

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Environmental Studies
	<ul style="list-style-type: none"> • Introduction of Unit • Multidisciplinary nature of environmental studies • Concept of sustainability and sustainable development. • Ecosystem: Structure and function of ecosystem • Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies\ • Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem • Aquatic ecosystems • Biodiversity and Conservation • Conclusion & Real Life Application
2.	Environmental Pollution and its Controls
	<ul style="list-style-type: none"> • Introduction of Unit • Environmental pollution: types, causes, effects and controls, Air, water, soil and noise pollution • Nuclear hazards and human health risks • Solid waste management: Control measures of urban and industrial waste. • Pollution case studies • Conclusion & Real Life Application
3.	Environmental Policies & Practices

	<ul style="list-style-type: none"> • Introduction of Unit • Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture • Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies. • Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. • International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD) • Conclusion & Real Life Application
4.	Human Communities and the Environment
	<ul style="list-style-type: none"> • Introduction of Unit • Human population growth: Impacts on environment, human health and welfare. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management: floods, earthquake, cyclones and landslides. • Conclusion & Real Life Application
5.	Field Work
	<ul style="list-style-type: none"> • Introduction of Unit • Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds and basic principles of identification. • Study of simple ecosystems-pond, river, Delhi Ridge, etc. • Conclusion & Real Life Application

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Environmental Studies	ErachBarucha	Latest	UGC
2.	Environmental Studies	Benny Joseph	Latest	Tata McgrawHill
3.	Environmental Studies	R. Rajagopalan	Latest	Oxford University Press
Reference Books				
1.	Principles of Environmental Science and Engineering	P. Venugoplan Rao	Latest	Prentice Hall of India.
2.	Environmental Science and Engineering	Meenakshi	Latest	Prentice Hall India.
Online Resources				
1.	https://www.coursera.org/browse/physical-science-and-engineering/environmental-science-and-sustainability			
2.	https://www.edx.org/learn/environmental-science			
3.	https://nptel.ac.in/courses/127105018			

COURSE OUTCOME

Students will be able to:

- Explain and represent to the various forms of data using statistics.
- Analyse the correlation and regression with their properties
- Explain and determine the basic concepts of probability and their properties.
- Analyse the equal and unequal intervals for Interpolation problem
- Analyse the numerical methods to solve differential equations

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Data representation and Analysis	08
2.	Regression and Correlation	08
3.	Random variable and Probability distribution	08
4.	Interpolation Methods	08
5.	Numerical integration and differentiation	08

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Data representation and Analysis
	<ul style="list-style-type: none"> • Introduction of Unit • Statistical diagram: scattered diagram, histogram, ogive curve, pie chart, Use of EXCEL software to compute statistical measures and diagrammatic representation • Measure of Central Tendency, Mean, Median, Mode. • Measure of Dispersion: Range, Quartile Deviation, mean deviation, Coefficient of mean Deviation, Standard Deviation • Conclusion & Real Life Application
2.	Regression and Correlation
	<ul style="list-style-type: none"> • Introduction of Unit • Measure of association between two variables Types of correlation, Karl Pearson's Coefficient of correlation • Spearman's Rank correlation and its interpretations • Regression Analysis: Concept and difference between correlation and regression, linear regression equations, • properties of regression coefficients • Conclusion & Real Life Application
3.	Random variable and Probability Distribution
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to basic Probability theory • Probability Addition, Multiplication, Conditional Probability, • Baye's Theorem and examples, • Discrete and continuous random variable, • Introduction of Standard probability distributions: Binomial, Poisson • Conclusion & Real Life Application
4.	Interpolation Methods
	<ul style="list-style-type: none"> • Introduction of Unit

	<ul style="list-style-type: none"> • Finite difference, Forward and backward differences, Interpolation and Extrapolation, • Newton's forward interpolation formula, Newton's backward interpolation formula, • Lagrange's interpolation formula • Newton's divided difference formula • Conclusion & Real Life Application
5.	Numerical Integration and differentiation
	<ul style="list-style-type: none"> • Introduction of Unit • Numerical integration, Gaussian integration Trapezoidal Method, Simpson's rule (1/3, 3/8), • Numerical differentiation Euler's method, Modified Euler's method, RungeKutta 2nd order method, Runge Kutta 4th order method., • Conclusion & Real Life Application

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Probability and Statistics for Engineers	Richard A Johnson	Latest	Prentice Hall of India.
2.	Introductory Methods of Numerical Analysis	S.S. Sastry	Latest	Prentice Hall of India
3.	Computer Oriented Numerical Methods	V. Rajaraman	Latest	Prentice Hall of India
Reference Book				
1.	Higher Engineering Mathematics, Grewal B. S. and Grewal J. S, Khanna Publishers, New Delhi, Latest Edition			
2.	A textbook of Computer based numerical and Statistical Techniques: A. K. Jaiswal & Anju Khandelwal, New Age International Publishers			
Online Resources				
1.	https://www.udemy.com/course/computer-oriented-numerical-techniques/			
2.	https://onlinecourses.swayam2.ac.in/cec22_ma02/preview			

COURSE OUTCOME

Students will be able to:

- Learn data types, loops, functions, array, pointers, string, structures and files.
- Develop conditional and iterative statements to write C programs.
- Implement concept of string using array.
- Allocate memory dynamically using pointers.
- Apply C Programming to solve real time problems.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to C Programming	6
2.	Decision Making & Looping	6
3.	Array and string	8
4.	Advance programming in C	8
5.	File handling & Additional features	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to C Programming
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to computer-based problem solving, Program design and implementation issues- Flowcharts & Algorithms. • Types of Languages – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters. • Overview of C, Data Types, Constants & Variables, Literals, Operators & Expressions • Conclusion & Real Life Application
2.	Decision Making & Looping
	<ul style="list-style-type: none"> • Introduction of Unit • Decision making in C- if statement, if-else statement, Nested if statement, if else if Ladder, Switch case • Loop control in C – for loop, while loop, do-while loop • Control flow in C- break, continue and goto statement. • Conclusion & Real Life Application
3.	Array and string
	<ul style="list-style-type: none"> • Introduction of Unit • Array- 1D array, 2D array and dynamic array • Scope rules- Local & global variables. • Functions-parameter passing, call by value and call by reference, calling functions with arrays, command line argument, recursion- basic concepts. • String – String in-build functions. • Conclusion of the Unit
4.	Advance programming in C
	<ul style="list-style-type: none"> • Introduction of Unit • Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers. • Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to

	<p>functions, structure pointers, arrays and structures within structures, typedef.</p> <ul style="list-style-type: none"> • Unions – Declaration, uses • Enumerated data-types • Conclusion of the Unit
5.	File handling & Additional features
	<ul style="list-style-type: none"> • Introduction of Unit • File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file • Advance features- storage classes and dynamic memory allocation • C Preprocessor- #define, #include, #undef, Conditional compilation directives. • C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions. • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Let us C, 6 th Edition	Yashwant Kanitkar	6 th Edition	PBP Publication
2.	The C programming Language	Richieand Kenninghan	2004	BPB Publication,
3.	Programming in ANSI C 3 rd Edition, 2005	E.Balagurusamy	3 rd Edition, 2005	Programming in ANSI C
Reference Book				
1.	<u>C Programming Absolute Beginner's Guide</u> Greg Perry 3rd edition Que Publishin0067			
2.	<u>Head First C: A Brain-Friendly Guide</u> David Griffiths 1st edition Shroff			
Online Resources				
1.	https://www.programiz.com/c-programming/examples			
2.	https://www.w3resource.com/c-programming-exercises			

COURSE OUTCOME:

Students will be able to:

- Create an effective web page, including an in-depth consideration of information architecture.
- Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
- Develop skills in analyzing the usability of a web site.
- Plan and conduct user research related to web usability.
- Apply HTML & CSS to solve real time web problems.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit(Hours)
1.	Introduction to HTML And Internet	8
2.	HTML & CSS	8
3.	HTML5, CSS3	8
4.	XML	6
5.	Practical Website Development	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to HTML And Internet
	<ul style="list-style-type: none"> • 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 • Conclusion of the Unit
2.	HTML & CSS
	<ul style="list-style-type: none"> • 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 color, Inline styles, External and Internal Style Sheets, Borders & boxing • Conclusion of the Unit
3.	HTML5, CSS3
	<ul style="list-style-type: none"> • Introduction to HTML5. • Introduction to 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 • Conclusion of the Unit

4.	XML
	<ul style="list-style-type: none"> • 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. • Conclusion of the Unit
5.	Practical website development
	<ul style="list-style-type: none"> • 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. • Conclusion of the Unit

C. RECOMMENDEDSTUDYMATERIAL:

S. No	Text Books:	Author	Edition	Publication
1	Practical Web Design for Absolute Beginners	AdrianW. West	2016	Apress 2016
2	Introducing Web Development	Jorg Krause	2017	Apress2017
3	HTML & CSS:The Complete Reference	Thomas Powell	2010 Fifth Edition	McGrawHill
Reference Book				
1	HTML and CSS: Design and Build Websites – by Jon Duckett			
2	Head First HTML and CSS: A Learner’s Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY			
Online Resources				
1	https://www.w3schools.com/html/html_links.asp			
2	https://www.tutorialrepublic.com/html-tutorial/html-links.php			

COURSE OUTCOME

Students will be able to:

- Explain the organization of basic computer, its design and the design of control unit.
- Demonstrate the working of central processing.
- Describe the operations and language of the register transfer, micro-operations and input- output organization.
- Organize memory and memory management hardware.
- Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Basics Of Digital Logics	8
2.	Register Transfer and Micro-operation	8
3.	Basic Computer Organization	8
4.	Modes of Data Transfer and Memory Organization	6
5.	Computer Arithmetic.	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Basics of Digital Logics
	<ul style="list-style-type: none"> • Introduction of Unit • Number systems : Binary number system, Octal & Hexa-decimal number system, Conversion of Number System, r's & (r-1)'s, Binary arithmetic Operations, • Logic Gates: AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates. • Boolean algebra: AND, OR, Inversion, Basic Boolean Law's, DE Morgan's theorem, Minimization techniques: K -Map, Sum of Product & Product of Sum,. • Conclusion & Real Life Application
2.	Register Transfer and Micro-operation
	<ul style="list-style-type: none"> • Introduction of Unit • Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. • Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit. • Conclusion & Real Life Application
3.	Basic Computer Organization
	<ul style="list-style-type: none"> • Introduction of Unit • Instruction Codes, Computer Registers: Common bus system, Computer Instructions • Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions. • Conclusion & Real Life Application
4.	Modes of Data Transfer and Memory Organization
	<ul style="list-style-type: none"> • Introduction of Unit • Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines.

	<ul style="list-style-type: none"> • Central Processing unit: Introduction of CPU. • Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, • Associative Memory, Cache Memory, Virtual Memory • Conclusion & Real Life Application
5.	Computer Arithmetic.
	<ul style="list-style-type: none"> • Introduction of Unit • Modes of Data Transfer: Priority Interrupt, Direct Memory Access, • 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. • Conclusion & Real Life Application

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Computer System Architecture	Morris Mano	Latest	PHI
2.	Computer Organization and Architecture	William Stallings	Latest	PHI
3.	Digital Computer Electronics:	Malvino	Latest	TMH
Reference Book				
1.	Computer Fundamentals Architecture and Organization by Ram B			
2.	Fundamental of Computer Organization and Design by Sivarama P Dandamudi			
Online Resources				
1.	http://nptel.iitm.ac.in/video.php?subjectId=106102062			
2.	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/			

COURSE OUTCOME

Students will be able to:

- Be familiar with the fundamentals and essentials of Cloud Computing.
- To know a sound foundation of the Cloud computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
- To manage the student different platform and Services of Cloud
- Explore some important cloud computing driven commercial systems such as GoogleApps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.
- To able to handle the daily and commercial life use of Cloud and capable to apply in it

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Fundamentals of Cloud Computing	07
2.	Cloud Models	08
3.	Cloud Platforms	08
4.	Cloud Computing - Challenges, Risk and Mitigation	07
5.	Managing the Cloud	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Fundamentals of Cloud Computing
	<ul style="list-style-type: none"> • Introduction of Unit • 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, Distribution over the Internet, • Conclusion of Unit
2.	Cloud Models
	<ul style="list-style-type: none"> • Introduction of Unit • 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, IaaS vs PaaS, 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 • Conclusion of Unit
3.	Cloud Platforms
	<ul style="list-style-type: none"> • Introduction of Unit • Introducing Cloud Platforms, Evaluating cloud platforms, Cloud Platform technologies-Amazon Web Services, Microsoft Azure, Google Cloud Platform, Salesforce.com • Impact of Cloud platforms. Private Cloud Platforms – Introducing Private clouds – Microsoft Azure

	<p>stack, Open stack, AWS Greengrass, Impact of Private clouds</p> <ul style="list-style-type: none"> • 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, • Conclusion of Unit
4.	Cloud Computing - Challenges, Risk and Mitigation
	<ul style="list-style-type: none"> • Introduction of Unit • 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. • Conclusion of Unit
5.	Managing the Cloud
	<ul style="list-style-type: none"> • Introduction of Unit • 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. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cloud computing a practical approach -	Anthony T.Velte , Toby J. Velte Robert Elsenpeter,	Latest	TMH.
2.	Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online -	Michael Miller	2008	Que 2008
Reference Book				
1	Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010			
2	Professional Mobile Application Development Jeff McWherter, Scott Pearson Education, 2012			
Online Resources				
1.	https://www.edx.org/learn/cloud_computing			

PRACTICAL

Code: BCACCA1201

Programming Fundamentals of C Lab

1Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Gain concept of functional hierarchical code organization.
- Work with textual information, characters and strings
- Implement file handling concepts
- Implement real time applications using the power of C language features.
- Overcome and solve possible errors during program execution.

A. LIST OF EXPERIMENTS:

1	Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x
2	Write a program that reads a floating point number and then displays the right-most digit of the integral part of the number.
3	Write a C program to calculate the sum of digits of given number.
4	Program to find largest and smallest number from four given number.
5	Program to find whether a year is leap or not
6	Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number.
7	Write a C Program to convert Decimal number to Binary number
8	Find the sum of this series upto n terms $1+2+3+4+5+6+\dots\dots\dots$
9	Program to print Armstrong's numbers from 1 to 100.
10	Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements
11	Write a C menu driven program
12	Write a program to generate the various pattern of numbers
13	Write a C Program to print the reverse of an integer number
14	Write a C program to perform the factorial of given number
15	Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise.
16	Write a C program to calculate factorial of a number using recursion.
17	Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order
18	Write a C program to perform to perform Matrix addition and multiplication operations.

19	Write a program to determine the length of the string and find its equivalent ASCII codes.
20	Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line
21	Write a program to maintain the library record for 100 books with book name, author's name, and edition, year of publishing and price of the book.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Let us C	Yashwant Kanetkar	6th Edition	PBP Publication
2.	The C programming Language	Richie and Kenninghan	2nd Edition 2004	PBP Publication,2004
3.	Programming in ANSI C	E Balaguruswamy	3rd Edition, 2005	Tata McGraw Hill
Reference Book				
1.	<u>C Programming Absolute Beginner's Guide</u> Greg Perry 3rd edition Que Publishin0067			
2.	<u>Head First C: A Brain-Friendly Guide</u> David Griffiths 1st edition Shroff			
Online Resources				
1.	https://www.programiz.com/c-programming/examples			
2.	https://www.w3resource.com/c-programming-exercises			

Course Outcome: -

Students will be able to:

- Apply the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
- Develop skills in analyzing the usability of a web site.
- Evaluate how to plan and conduct user research related to web usability.
- Learn the language of the web: HTML and CSS.

A. LIST OF EXPERIMENTS:

1	Hello World Web Page a) Create a web page using basic HTML features like tags, attributes, elements and page title. b) How to install and configure a web server
2	Create a My Profile Page a) Using text boxes, check boxes, radio buttons and submit buttons. b) Design a web page using CSS include the following: i. Control the repetition of image with back ground-repeat property. ii. Define style for links as: link, b:active,c:hover,d:visited. iii. Add customized cursors for links.
3	Create a My Profile Page a) A more functional web page by making use of headings, paragraphs, lists, images and links. b) Design a web page using CSS include the following: i. Use different font styles. ii. Set back ground image for both the page and single elements on the page.
4	Create XML Http Request and retrieve data from a text file and an XML file.
5	Create the following webpage: a) Show the class time table in a tabular format. b) Create a web page using HTML to show your geolocation.
6	Create a webpage using HTML for audio and video player.
7	Create a log in registration form using PHP.
8	Develop a PHP web page to manipulating files such as creating ,writing, reading and uploading.
9	Create a dynamic web page by using PHP conditional operators, loops and strings to create an dynamic time table page.
10	Develop a PHPweb application track the user as how many times visited and last visited time
11	Develop a static website–I.
12	Develop a static website–II.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Practical Web Design for Absolute Beginners	AdrianW. West	2016	Apress 2016
2.	Introducing Web Development	Jorg Krause	2017	Apress2017
3.	HTML & CSS: The Complete Reference	Thomas Powell	2010, FifthEdition	McGrawHill,
Reference Book				

1.	HTML and CSS: Design and Build Websites – by Jon Duckett
2.	Head First HTML and CSS: A Learner’s Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY
Online Resources	
1.	https://www.w3schools.com/html/html_links.asp
2.	https://www.tutorialrepublic.com/html-tutorial/html-links.php

Course Outcome: -

Students will be able to:

- Prepare document in MS word using pictures and editing properly.
- Construct forms in MS. Word
- Protect a document from unauthorized access by assigning password
- Prepare worksheet to keep records and how to use mathematical formula in same
- Present a Presentation using MS Power point

A. LIST OF EXPERIMENTS:

1	MS Word 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: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 area 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 Page1of 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 'Poornima University Jaipur'.
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
7	MS-Excel Open a new work book, save it as JavaCoffeeBar.xls. In sheet 1 write following sales data for JavaCoffee bar to show their first 6 months sales. <ul style="list-style-type: none"> • Select cell B4:D4 and change the horizontal alignment to center and text to 90degree. • All titles should be in bold • Format all cells numbers to currency style and adjust width as necessary. • Add border to data..
8	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)
9	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 1-4 Rs.100 to be deducted as Professional Tax. Find the netpay.
10	For the above employee worksheet perform the following operations <ul style="list-style-type: none"> • 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 2yrs
11	Using Excel project the Products ales for any five products for five years. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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.
14	MS Power Point 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.

Course Outcome: -

Students will be able to:

- Identify the peripherals of a computer, components in a CPU and its functions.
- Install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.
- Trouble Shoot software/Hardware and Identify defective peripherals
- Configure the TCP/IP setting. Get connected to local area network and access internet
- Surfing the Web and customize the web browser according to their need.

A. LIST OF EXPERIMENTS:

1	Peripherals of a computer, System unit, CPU, Mother Board, FDD, CD ROM Drive, HDD, Ethernet Card, Monitor, Keyboard, Mouse & Speakers. And there connecting slots with name
2	Different Slots of motherboard and there connections.
3	Installing operating system like Linux or MS windows on the personal computer.
4	Configured system as dual boot with both windows and Linux
5	Disk formatting, partitioning and Disk operating system commands
6	Part1. Identify the hardware/ software problem and fix it .
7	Part2. Identify the hardware/ software problem and fix it to get the computer back to function.
8	Configure the TCP/IP setting in local area network and access the internet.
9	Customize their web browsers with the LAN proxy settings, <ul style="list-style-type: none"> • bookmarks, search toolbars and pop up blockers. • Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
10	Search Engines & Netiquette How to use the search engines. Effective use of search engines like Google, Yahoo, ask.com
11	Cyber Hygiene: viruses on the internet and install antivirus software customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms

Course Outcome: -

Students will be able to:

- Demonstrate the grammar skills involved in writing sentences and short paragraphs.
- Build up a good command over English grammar and vocabulary to be able to ace error spotting.
- Define unknown words in sentence level context using a picture dictionary or by creating a memory link for support.
- Analyze and effectively use the conventions of the English language.
- Develop their interest in reading and enhance their oral and silent reading skills along with sharpen their critical and analytical thinking.

A. LIST OF EXPERIMENTS:

1	Parts of Speech: Theory & Practice through various Exercises
2	Sentence Structures: Theory & Practice through various Exercises
3	Tenses: Theory & Practice through various Exercises
4	Spotting the Errors: Applying the rules and Practice Questions
5	Vocabulary Building-I: Practice by sentence formation
6	Vocabulary Building-II: Practice by sentence formation
7	Paragraph Writing
8	Article Writing
9	Précis Writing
10	Formal & Informal Letter Writing
11	Reading Comprehension- I: Beginner's level reading and Answering the Questions (Competitive Exams)
12	Reading Comprehension- II: Intermediate's level reading and Answering the Questions (Competitive Exams)

Course Outcome: -

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the FIRST Semester are as follows:

Code	Activity	Hours	Credits
BCACCA1601	Talent Enrichment Programme(TEP)-I	2	1
	Library / MOOC / Online Certificate Courses	2	
	Non Syllabus Project (NSP) / Industry Visit / CRT	2	

Semester-II

SEMESTER II

DEPARTMENT CORE COURSES

Code: BCACCA2101

Computer Networks

3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Gain the knowledge of the basic computer network technology and become familiar with layered communication architectures (OSI and TCP/IP).
- Acquire basics of Framing and Error detection including parity, checksums, and CRC.
- Gain the knowledge of the basic IP configuration used for Networking. Also clear the concept of Logical and Physical Addressing
- Know the concepts of reliable data transfer and how TCP implements these concepts.
- Learn the principles of WAN routing and the semantics.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Networking Fundamentals & Internet	09
2.	Basics Presentation & Application Layer	07
3.	Basics of Transport layer & Network, Layer	08
4.	Basics of Data Link Layer	07
5.	Basics of WAN Technology	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Networking Fundamentals & Internet
	<ul style="list-style-type: none"> • Basics of Network & Networking, Types of Networks: LAN, MAN, WAN, Peer-to-Peer & Client/Server, Workgroup V/S. Domain, Network Topologies. The Internet, Network Devices- NIC, Hub, Switch, Bridge, Router, Gateways, Firewall, Repeater, CSU/DSU, and modem, Introduction of OSI model, and TCP/IP Model, Comparison between OSI model & TCP/IP model. Physical Layer: Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, Media connectors (Fiber optic, Coaxial, and TP etc.) Switching Methods (Circuit/Packet Switching) Uni-cast, Multicast, Broadcast • Conclusion & Real Life Application
2.	Basics Presentation & Application Layer
	<ul style="list-style-type: none"> • Presentation Layer protocols:-TLS, SSL, MIME • Application Layer: Functions and support, Application Layer Protocols: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP. • Conclusion & Real Life Application
3.	Basics of Transport layer & Network, Layer
	<ul style="list-style-type: none"> • Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets • Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 Datagram Format, IPv4 addressing, IPv4 address Classes, IPv4 address types, Default Gateway, Public & Private IP Address, methods of assigning IP address, Subnet Mask and sub-netting, IPv6 address, types, assignment, Data encapsulation, Introduction to Routing and Switching concepts. • Conclusion & Real Life Application

4.	Basics of Data Link Layer
	<ul style="list-style-type: none"> • Application of Data Link Layer: Framing and Error detection and correction. Stop and Wait protocol, Sliding Window protocols Go-Back-N Protocol, Channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols. Wireless Networking, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless security Protocols: WEP,WPA, 802.1X. • Conclusion &Real Life Application
5.	Basics of WAN Technology
	<ul style="list-style-type: none"> • What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fibre, Cellular Technologies • Connecting LANs: Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual LAN, Virtual Private Networking • Conclusion &Real Life Application

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Computer Network	AndrewS. Tanenbaum	2013	Pearson
2.	Computer Networking: Top Down Approach	Kurose. Ross	2017	Pearson
Reference Book				
1.	Networking All in One – Doug Lowe 7 th edition Publisher- Wiley			
Online Resources				
1.	https://www.edx.org/learn/computer-networking			
2.	https://www.youtube.com/watch?v=VwN91x5i25g			

COURSE OUTCOME

Students will be able to:

- Acquire the concepts and features of object oriented programming
- Learn java's exception handling mechanism, multithreading, packages and interfaces.
- Implement object oriented programming concepts using java
- Apply object oriented programming features and concepts for solving given problem
- Implement the concept of class and objects with access control to represent real world entities.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Java	08
2.	Working with classes ,objects and Inheritance	09
3.	Packages, Interfaces & Exception Handling	09
4.	Multithreaded Programming & Applet	07
5.	JAVA Database Connectivity (JDBC) and Java 8 Features	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Java
	<ul style="list-style-type: none"> • Introduction to Unit • History and Overview of Java • Object Oriented Programming features. • Class Fundamentals • Declaring objects, Assigning object reference variables. • Literals, variables comments, separators, • Scope and Life Time of Variables • Data types - Integers, Floating point, characters, Boolean, • Type conversion and casting • Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. • Conclusion of unit
2.	Working with classes, objects and Inheritance
	<ul style="list-style-type: none"> • Introduction to Unit • Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements. • 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. • Command line arguments. • Inheritance – Basics, Using super, method overriding, and Dynamic method Dispatch, Using abstract classes and final with Inheritance. • Conclusion of Unit
3.	Packages, Interfaces & Exception Handling

	<ul style="list-style-type: none"> • Introduction to Unit • Definition and Implementation, Access protection importing packages. • Interfaces: Definition and implementation. • Exception Handling – Fundamentals, types, Using try and catch • Multiple catch clauses • Nested try Statements, Throw, finally. • User Defined Exception • Conclusion of Unit
4.	Multithreaded Programming & Applet
	<ul style="list-style-type: none"> • Introduction of Unit • Java thread model – main thread, creating single Multithreading • Is alive () and join () Methods • Thread – Priorities, Synchronization • Inter thread communication, suspending, resuming and stopping threads • Reading control input, writing control output, Reading and Writing files. • Applet Fundamentals – AWT package • AWT Event handling concepts. • Conclusion of Unit
5.	JAVA Database Connectivity (JDBC) and Java 8 Features
	<ul style="list-style-type: none"> • Introduction to Unit • 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. • JDBC application to query a database. • Introduction to java 8 features :-Functional Interfaces And Lambda Expressions • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	The complete reference Java –2	Herbert Schildt	V Edition,	TMH.
2.	SAMS teach yourself Java – 2	Rogers Cedenhead and Leura Lemay	3rd Edition,	Pearson Education
Reference Book				
1.	Object Oriented Programming with Java PUBLISHER PHI by M.T. Somashekara (Author), D.S. Guru (Author), K.S. Manjunatha (Author)			
2.	“Head First Java” by Kathy Sierra			
Online Resources				
1.	https://www.programiz.com/java-programming/online-compiler/			
2.	https://www.tutorialspoint.com/compile_java_online.php			
3.	https://oncompiler.com/java			

COURSE OUTCOME

Students will be able to:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyse worst-case running times of algorithms using asymptotic analysis.
- Analyse time complexities of various searching, sorting.
- Create various applications using stack, queue, tree and graph.
- Able to select relevant data structure to solve the problem.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Data structures	8
2.	Searching and Sorting	8
3.	Stack and Queue	8
4.	Linked List	9
5.	Tree Graphs and their Applications	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Data structures
	<ul style="list-style-type: none"> • Introduction to Unit • Definition, • Classification of data structures: primitive and non-primitive • Elementary data organization • Time and space complexity of an algorithm (Examples), String processing. • 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, advantages, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD. • Conclusion and Real Life Applications of unit
2.	Searching and Sorting
	<ul style="list-style-type: none"> • Introduction to Unit • Basic Search Techniques - Sequential search, Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. • Sorting: General background and definition-Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort • Conclusion and Real Life Applications of unit
3.	Stack and Queue
	<ul style="list-style-type: none"> • Introduction to Unit • Stack – Definition • Array representation of stack • Operations on stack: Infix, prefix and postfix notations • Conversion of an arithmetic expression from Infix to postfix

	<ul style="list-style-type: none"> • Applications of stacks. • Definition of queue • Array representation of queue • Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, • Operations on all types of Queues • Conclusion and Real Life Applications of Unit
4.	Linked List
	<ul style="list-style-type: none"> • Introduction of Unit • Definition of linked list • 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 • Conclusion and Real Life Applications of Unit
5.	Tree Graphs and their Applications
	<ul style="list-style-type: none"> • Introduction to Unit • 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. • Conclusion and Real Life Applications of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Schaum's outline series Data structures	Lipschutz	Latest	TMH.
2.	Data Structures and program designing using 'C'	Robert Kruse	Latest	Pearson Education
Reference Book				
1.	Introduction to Data Structures in C by-Kamthane Pearson Education 2005			
2.	Data Structures Using C by-Bandyo Padhyay Pearson Education			
Online Resources				
1.	https://www.gatevidyalay.com/data-structures/			
2.	https://www.youtube.com/watch?v=QBrDsG3MTkw			
3.	https://www.tutorialspoint.com/data_structures_algorithms/index.htm			

COURSE OUTCOME

Students will be able to:

- Know structure and organization of the file system.
- Get concept what a process is and how processes are synchronized and scheduled.
- Acquire different approaches to memory management.
- Use system calls for managing processes, memory and the file system.
- Know the data structures and algorithms used to implement an OS.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Operating System Overview	08
2.	Process Management	08
3.	Process Deadlocks	08
4.	Memory Management	09
5.	File Management	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Operating System Overview
	<ul style="list-style-type: none"> • Introduction of Unit • Definition, Two views of operating system, Evolution of operating system, Types of OS. • System Call, Handling System Calls, System Programs, Operating System Structures, • The Shell, Open Source Operating Systems • Conclusion of Unit
2.	Process Management
	<ul style="list-style-type: none"> • Introduction of Unit • Process v/s Program, Multi-programming, Process Model, Process States, Process Control Block. • Threads, Thread v/s Process, User and Kernel Space Threads. • Inter Process Communication, Race Condition, Critical Section • Implementing Mutual Exclusion: Mutual Exclusion with Busy Waiting • Interrupts, Lock Variables, Strict Alteration, Peterson's Solution, Test and Set Lock. • Sleep and Wake-up, Semaphore, Monitors, Message Passing. • Classical IPC problems: Producer Consumer, Sleeping Barber, Dining Philosopher Problem • Process Scheduling: Goals, Batch System Scheduling (First-Come First-Served, Shortest Job First, Shortest Remaining Time Next), Interactive System Scheduling (Round-Robin Scheduling, Priority Scheduling, Multiple Queues), Overview of Real Time System Scheduling • Conclusion of Unit
3.	Process Deadlocks
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction, Deadlock Characterization, Preempt able and Non-preempt able Resources • Resource – Allocation Graph, Conditions for Deadlock.

	<ul style="list-style-type: none"> • Handling Deadlocks: Ostrich Algorithm, Deadlock prevention, Deadlock Avoidance. • Deadlock Detection (For Single and Multiple Resource Instances), Recovery From • Deadlock (Through Preemption and Rollback) • Conclusion of Unit
4.	Memory Management
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction, Mono programming vs. Multi-programming, Modeling Multiprogramming, Multiprogramming with fixed and variable partitions, Relocation and Protection. • Memory management (Bitmaps & Linked-list), Memory Allocation Strategies • Virtual memory: Paging, Page Table, Page Table Structure, Handling Page Faults, TLB's • Page Replacement Algorithms: FIFO, Second Chance, LRU, Optimal, LFU, Clock, WS- Clock, Concept of Locality of Reference, Belady's Anomaly • Segmentation: Need of Segmentation, its Drawbacks, Segmentation with Paging(MULTICS) • Conclusion of Unit
5.	File Management
	<ul style="list-style-type: none"> • Introduction of Unit • File Overview: File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Single Level, two Level and Hierarchical Directory Systems, File System Layout. • Implementing Files: Contiguous allocation, Linked List Allocation, Linked List • Allocation using Table in Memory, Inodes. • Directory Operations, Path Names, Directory Implementation, Shared Files • Free Space Management: Bitmaps, Linked List • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Operating system concepts	Silberschatz, Galvin, Gagne	8 th edition	John Wiley and Sons
2	Modern Operating System	A.S.Tanenbaum	2nd Edition	Pearson
Reference Books				
1.	Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.			
Online Resources				
1.	https://www.coursera.org/courses?query=operating%20system			
2.	https://hackr.io/tutorials/learn-operating-systems			

COURSE OUTCOME

Students will be able to:

- Explain the core concepts of the Ad Hoc Network.
- Know Ad Hoc Routing Protocols
- Identify Wireless Network challenges
- Implement and Handle working with Sensor Network
- Develop technical development skills

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Ad Hoc Networking	07
2.	Overview of Ad Hoc Routing Protocols	08
3.	Transport Layer for Ad Hoc Wireless Network	08
4.	Sensor Network	07
5.	Remote Mobility	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Ad Hoc Networking
	<ul style="list-style-type: none"> • Introduction of Unit • An introduction, Model of operation, symmetric Links, Layer-2 Ad Hoc solutions, Proactive versus reactive protocols, multicast, commercial Applications of Ad Hoc networking, • Home Networking, Emergency services, personal Area Networks and Bluetooth, • Embedded Computing Applications, Sensor Dust, Automotive/PC Interaction. • Factors Affecting Ad Hoc Networks, Scalability, Wireless Data Rates, DARPA packet Radio network, Survivable Radio Networks. • Ad Hoc Wireless Media Access Protocols: Issues in Designing a MAC protocol for Ad Hoc Wireless networks. • Design Goals of a MAC Protocol for Ad Hoc Wireless Networks. Classifications of MAC Protocols. Contention-Based Protocols, • Contention-Based Protocols with reservation Mechanisms. Contention –Based MAC Protocols with Scheduling Mechanisms. MAC protocols that use Directional Antennas. Other MAC Protocols. • Conclusion of Unit
2.	Overview of Ad Hoc Routing Protocols
	<ul style="list-style-type: none"> • Introduction of Unit • Table-Driven Approaches, Destination Sequenced Distance Vector (DSDV), • Wireless Routing Protocol (WRP), Cluster Switch Gateway Routing (CSGR) , • Source-Initiated On –Demand Approaches . • Ad Hoc OnDemand Distance Vector Routing (AODV) , Dynamic Source Routing (DSR) • Temporally Ordered Routing Algorithm (TORA), Signal Stability Routing (SSR) • Location-Aided Routing (LAR) , Power –Aware Routing (PAR), Zone Routing Protocol (ZRP) • Source Tree Adaptive Routing (STAR) , Relative Distance Microdiversity Routing (RDMAR)

	<ul style="list-style-type: none"> • Multicast Routing in Mobile Ad Hoc Networks, Existing Ad Hoc Multicast Routing Protocol • ABAM : Associativity-Based Ad Hoc Multicast. • Conclusion of Unit
3.	Transport Layer for Ad Hoc Wireless Network
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction , Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks • Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions • Issues and challenges in providing QoS in Ad Hoc Wireless Networks, • Classification of QoS Solutions, MAC Layer Solutions, MAC Layer Solutions • Conclusion of Unit
4.	Sensor Network
	<ul style="list-style-type: none"> • Introduction of Unit • Sensor Network Architecture, Network Protocols • Data Storage and Manipulation, Localization and Management • Data Dissemination, Data Gathering, MAC protocols for Sensor Networks, • Location Discovery, Quality of a Sensor Network, • Evolving Standards. Security issues in Ad Hoc Network: Security in Ad Hoc Wireless Network • Network Security Requirements, Issues and Challenges in Security Provisioning • Network Security Attacks, Key Management, and Secure Routing in Ad Hoc Wireless Networks. • Conclusion of Unit
5.	Remote Mobility
	<ul style="list-style-type: none"> • Introduction of Unit • The Internet – Wired Communication Links , Wireless Links – Properties of Networked Telerobotics • Building a Networked Telerobotic system ,State command Presentation ,Command Execution/ State Generation – Collaborative Control • Robot Manipulators ,Teleoperation on a local network , Teleoperation via a constrained link • Introduction to networked robot system on the Web – Software Architecture and design – Interface design. • Autonomous Mobile Robot on the Web – Mobile Mini Robots • Performance of Mobile Robots controlled through WEB – Handling Latency in Internet based Tele operation • Computer Networked Robotics – Online Robots and the Robot Museum • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Springer Handbook of Robotics	Bruno Siciliano, Oussama Khatib	2010	Springer Science and Business
2.	Ad Hoc Mobile Wireless Networks	C. K. Toh		Springer
Reference Book				
1.	Handbook of Cloud Computing			
2.	Cloud Robotics – Distributed Robotics using Cloud Computing			
3.	Ad Hoc Wireless Networks : Architectures and protocols			

Online Resources

- | | |
|----|---|
| 1. | https://www.studocu.com/in/document/visvesvaraya-technological-university/adhoc-networks/10ec844-lecture-notes-1-10/16438688 |
| 2. | https://www.tutorialspoint.com/what-is-ad-hoc-network |

PRACTICAL

Code: BCACCA02201

Operating System Lab

1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

- Implement basic Scheduling algorithms and memory allocation techniques.
- Implement memory management techniques like MVT and MFT
- Implement memory allocation algorithms.
- Detect deadlocks and avoid them.
- Implement different page replacement algorithms

A. LIST OF EXPERIMENTS:

1.	Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin d) Priority
2.	Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c) Linked
3.	Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue
4.	Write a C program to simulate the MVT and MFT memory management techniques.
5.	Write a C program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit
6.	Write a C program to simulate paging technique of memory management
7.	Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.
8.	Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN
9.	Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU
10.	Write a C program to simulate page replacement algorithms
11.	Write a C program to simulate producer-consumer problem using semaphores.
12.	Write a C program to simulate the concept of Dining-Philosophers problem.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Operating system concepts	Silberschatz, Galvin, Gagne	8 th Edition	John Wiley and Sons
2.	Modern Operating System	A.S.Tanenbaum	2 nd Edition	Pearson
Reference Book				
1.	Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.			
Online Resources				
1.	https://www.coursera.org/courses?query=operating s...			

Course Outcome:-

Students will be able to:

- Implement object oriented programming concepts to solve real world problems
- Implement the concept of class and objects with access control to represent real world entities.
- Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).
- Create concepts on file streams and operations in java programming for a given application programs
- Create the backend connectivity process in java program by using JDBC drivers

A. LIST OF EXPERIMENTS:

1	A. Write a program to print “Hello World” in Java. B. Write a program to add two numbers C. Write a program to demonstrate the different access specifiers D. Write a program which uses different packages
2	A. Write a program to demonstrate inheritance, abstraction, encapsulation and Polymorphism. B. Write a program to find the factorial of n numbers C. Write a program to calculate Fibonacci series D. Write a program to add n numbers and series
3	A. Write a program to create an array and store elements into the array. B. Write a program to find the sum of elements in an array C. Write a program to demonstrate switch case, if, if-else and for loop
4	A. Write a program to demonstrate the working of methods. B. Write a program which has four methods – add(), subtract(), multiply() and divide() and demonstrate a simple console calculator. C. Write a program to accept command line arguments and display them to the user
5	A. Write a program to create a package. B. Write a program to handle different exceptions
6	A. Write a program to demonstrate try-catch, throw and throws. B. Write a program for user defined exception
7	A. Write a program to read a file Write a program to write into a file
8	Write a program to demonstrate client server communication (socket programming)
9	Write a program to create threads and manipulate them
10	Write a program to create a user interface to check user authentication.
11	Write a program to create a registration form and save the details into a file
12	Write a program to save and fetch the details from database

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	The complete reference Java –2	Herbert Schildt	5 th Edition,	TMH.
2	SAMS teach yourself Java – 2	Rogers Cedenhead and Leura Lemay	3 rd Edition,	Pearson Education
Reference Book				
1	Object Oriented Programming with Java PUBLISHER PHI by M.T. Somashekara (Author), D.S. Guru (Author), K.S. Manjunatha (Author)			
2	“Head First Java” by Kathy Sierra			
Online Resources				
1	https://www.programiz.com/java-programming/online-compiler/			
2	https://www.tutorialspoint.com/compile_java_online.php			
3	https://onecompiler.com/java			

COURSE OUTCOME

Students will be able to:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyse worst-case running times of algorithms using asymptotic analysis.
- Implement various searching, sorting.
- Create various applications using stack , queue, tree and graph.
- Implement relevant data structure to solve the problem.

A. List of Programs:

1	Use a recursive function to find <ol style="list-style-type: none"> a) GCD of two numbers. b) Use a recursive function to find the Fibonacci series. c) Factorial d) Binomial Coefficient
2	Perform the following: <ol style="list-style-type: none"> a) Insert an integer into a given position in an array. b) Deleting an integer from an array.
3	Perform the following: <ol style="list-style-type: none"> a) Write a program for linear search b) Write a program for Binary search c) Write a program to sort N numbers using bubble sort.
4	Perform the following: <ol style="list-style-type: none"> a) Write a program to sort N numbers using insertion sort. b) Write a program to sort N numbers using selection sort. c) Write a program to sort N numbers using bubble sort.
5	Write a program to sort N numbers using quick sort.
6	Write a program to sort N numbers using merge sort.
7	Write a C program to create Stack using array.
8	Write a C program to create queue using array.
9	Write a program to create a linked list and to display it.
10	Inserting a node into a singly linked list on various position beginning, after given location and end.
11	Deleting a node into a singly linked list on various position beginning, after given location and end.
12	Write a C program to create stack and queue using linked list.
13	Creating a binary search tree and traversing it using in order, preorder and postorder.
14	Write a C program to implement graph.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	<u>Publication</u>
1.	Schaum's outline series Data structures	Lipschutz	Latest	TMH.
2.	Data Structures and program designing using 'C'	Robert Kruse	Latest	Pearson Education
3.	Programming in ANSI C.	E. Balaguruswamy	Latest	TataMcGraw Hill
4.	Data Structures Using C	Bandyo padhyay	1999	Pearson Education
5.	Data Structures Using C	Tenenbaum	200	Pearson Education,
6.	Introduction to Data Structures in C	Kamthane	2005	Pearson Education

COURSE OUTCOME

Students will be able to:

- Use the clamping tool for making Cross and Straight cable and identify network IP
- Create local area network and do file sharing activity
- Configure switch and routers
- Configure WEP and Ethernet.
- Recognize static and dynamic routing

A. List of Programs:

1	Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool
2	Study/Demonstration of Network Devices and network IP in Detail.
3	Troubleshooting Scenarios Network -I (Basic network command and Network configuration commands.
4	Connect the computers with file sharing in Local Area Network.
5	Creating LAN using different topology using Cisco Packet Tracer
6	Configure DHCP Server using Cisco PacketTracer
7	Performing an Initial Switch Configuration.
8	Performing an Initial Router Configuration
9	Configuring WEP on a Wireless Router
10	Configuring Ethernet and Serial Interfaces.
11	Observing Static and Dynamic Routing
12	Configuring Static and Default Routes.

B. RECOMMENDED STUDY MATERIAL

1.	Computer Network	AndrewS. Tanenbaum	2013	Pearson
2.	Computer Networking: Top Down Approach	Kurose. Ross	2017	Pearson
Reference Book				
1.	Networking All in One – Doug Lowe 7 th edition Publisher- Wiley			

COURSE OUTCOME

Students will be able to:

- Know the nuances of language through audio- visual experience and group activities.
- Neutralize the accent for intelligibility and develop confidence in speaking with clarity enhancing their employability skills.
- Demonstrate an understanding of grammatical structures in conversations and discussions.
- Utilize the knowledge of confidence building strategies to manage one's own thoughts and emotions. Identify the requirements of skills development and apply their learning to sharpen the same.

UNIT NO.	UNIT NAME	Hours
1	Introduction to Communication Skills on Learning Software	6
2	Concepts of Phonetics	4
3	Grammar Practice	6
4	Confidence Enhancement Activities	4
5	Skills Enhancement Activities	5

A. List of Programs:

1.	Listening Skills
2.	Reading Comprehension
3.	Writing Skills
4.	Phonetics I
5.	Phonetics II
6.	Grammar and Common Errors Usage
7.	Conversation
8.	Role Plays
9.	Presentation Skills I
10.	Presentation Skills II
11.	Group Discussion
12.	Interview Skills

COURSE OUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -II, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Second Semester are as follows:

Code	Activity	Hours	Credits
BCACCA2601	Talent Enrichment Programme (TEP)-II	2	1
	Library / MOOC / Online Certificate Courses	2	
	Non Syllabus Project (NSP) / Industry Visit / CRT	2	

Semester-III

SEMESTER III

DEPARTMENT CORE COURSES

Code:BCACCA3101

Relational Database Management System

3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
- Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
- Learn and apply structured query language (SQL) for database definition and database manipulation.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Identify various transaction processing, concurrency control mechanisms and database protection mechanisms.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	Introduction to Database Management System	7
2	RDBMS	7
3	SQL	7
4	PL/SQL	8
5	Oracle, Trigger and wrapping	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Database Management System
	<ul style="list-style-type: none"> • Introduction to Database Management System • Characteristics of database approach • Advantages of DBMS • Schemas: Three schema architecture - The external level, the conceptual level and the internal level. • Data Independence • Database languages and Interfaces • Roles of Database Administrator • Introduction to Data Models (Hierarchical, Network and Relation) • Entity type, Entity sets, Attributes and keys. • The ER Model: ER Diagram & Database design with the ER Model • Conclusion of the Unit
2.	RDBMS
	<ul style="list-style-type: none"> • Introduction to Distributed Database • Classification of DBMS • Introduction to RDBMS • Relational Model –Concepts • Relational operations (Insert, delete, update, select, project, rename, union, intersection, minus, Join, division) • Transactions and ER mapping Examples • Normalization of RDBMS (1NF, 2NF, 3NF and 4NF) and inference rules.

	<ul style="list-style-type: none"> • Conclusion of the Unit
3.	SQL
	<ul style="list-style-type: none"> • Introduction to Unit • DBMS v/s RDBMS • Introduction to SQL: Data types, Constraints • Commands in SQL: Create table, Drop command, Alter Queries in SQL • Statements in SQL (Insert, delete and update) • Features of SQL • Manipulation of data • Tables in SQL • Conclusion of the Unit
4.	PL/SQL
	<ul style="list-style-type: none"> • Introduction to PL/SQL • Approaches to database programming: with function calls, Embedded SQL using CURSORS, Dynamic SQL, SQL commands in Java, Retrieving multiple triples using Iterators • Advantages of PL/SQL • Features of PL/SQL :Blocks structure, Error handling, Input and output designing, variables and constant, data abstraction, control structures and subprogram • Fundamentals of PL/SQL : character sets, lexical, delimiters, identifiers, declarations, scope and visibility, Static and dynamic and static SQL, Implicit and explicit locking • Conclusion of the Unit
5.	Oracle, Trigger and wrapping
	<ul style="list-style-type: none"> • Introduction to Oracle, Trigger and wrapping • Functions/responsibilities of DBA • Oracle product details • Oracle files, System and User process • Oracle Memory • Protecting data: Oracle backup & recovery • Triggers - types, uses, data access for triggers • PL/SQL Packages and Wrapping • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	Database System Concepts	S. Sudarshan, Henry F. Korth, Avi-Silberschatz	6 th Edition	McGraw Hill
2.	SQL, PL/SQL	Ivan Bayross	Latest	BPB
3.	Oracle Complete Reference	Kevin Loney	Latest	BPB
Reference Book				
1.	PL/SQL, best practices, BPB Publications, Steven Feuerstein			
2.	The Oracle Cook Book, BPB Publications, Liebschutzy			
3.	Oracle A Beginners Guide, TMH Publication, Michael Abbey, Michael J. Corey			

Online Resources

- | | |
|----|---|
| 1. | https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm |
| 2. | https://nptel.ac.in/courses/106106093 |
| 3. | https://www.coursera.org/learn/introduction-to-relational-databases |

COURSE OUTCOME

Students will be able to:

- Acquire the basic terminology used in computer programming to write, compile and debug programs in Python programming language.
- Use different data types to design programs involving decisions, loops, and functions for problem solving
- Apply various object oriented programming
- Handle the exceptions which are raised during the execution of Python scripts
- Implement files and classes in the Python programming environment

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1	Introduction to Python Programming	07
2	Python Operators and Control Flow statements	09
3	Data Structures, Python Functions and Packages	09
4	Object Oriented Programming	08
5	File I/O Handling and Exception Handling	09

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Python Programming
	<ul style="list-style-type: none"> • Introduction to Unit • What is Python, • Uses of Python Programming Language / Python Applications • Features of Python Programming Language • Python-2 and Python-3 differences • Python environment setup — Installation and working of IDE • Running Simple Python scripts to display 'welcome' message. • Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of data types • Python building blocks — Identifiers, Keywords, Indention, Variables, Comments • Conclusion of unit
2.	Python Operators and Control Flow statements
	<ul style="list-style-type: none"> • Introduction to Unit • Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence • Control Flow: • Conditional Statements (if, if ... else, nested if) • Looping in python (while loop, for loop, nested loops) • loop manipulation using continue, pass, break, else. • .Conclusion of Unit
3.	Data Structures, Python Functions and Packages
	<ul style="list-style-type: none"> • Introduction to Unit • Lists, Tuple, Sets, Dictionaries • String and Slicing • Use of Python built

	<ul style="list-style-type: none"> • User defined functions and its types • Command-line Arguments • Python Packages: Introduction, Writing Python packages • Using standard packages (e.g. math, scipy, Numpy, matplotlib, pandas etc.) • user defined packages • Conclusion of Unit
4.	Object Oriented Programming
	<ul style="list-style-type: none"> • Introduction of Unit • Creating Classes and Objects • Inheritance • Method Overloading and Overriding • Data Hiding • Data abstraction, Abstract classes • Types of Methods : Instance Methods , Static Methods , Class Methods • Accessing attributes , Built-In Class Attributes • Destroying Objects • Conclusion of Unit
5.	File I/O Handling and Exception Handling
	<ul style="list-style-type: none"> • Introduction of Unit • Types of File • File Objects, File Built-in Function, File Built-in Methods • File Built-in Attributes • Read/write operations Reading Text • Moving cursor in file inbuilt -functions • Errors in Python : Compile-Time Errors ,Runtime Errors , Logical Errors • What is Exception? • try...except...else, try-finally clause • Regular expressions • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Core Python Programming	Chun, JWesley	2007	Pearson,
2.	Head First Python	Barry,Paul	2010	ORielly,

Reference Book	
1	Learning Python Lutz, Mark O Rielly, 2009
Online Resources	
1	https://www.learnpython.org/
2	https://realpython.com/start-here/
3	https://www.programiz.com/python-programming

COURSE OUTCOME

Students will be able to:

- Use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.
- Write Shell Programming using Linux commands.
- Design and write application to manipulate internal kernel level Linux File System.
- Develop IPC-API's that can be used to control various processes for synchronization.
- Develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Linux and Linux utilities	07
2.	Introduction to shells	08
3.	Unix file structure	08
4.	Process and signals	07
5.	Inter process communication	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Linux and Linux utilities
	<ul style="list-style-type: none"> • Introduction of Unit • INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX, • features of LINUX, introduction to vi editor. • Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, • process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, • ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text Processing utilities and backup utilities , tail, head , • sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio • Conclusion of Unit
2.	Introduction to shells
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, • Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, • Variables, Predefined Variables, Options, Shell/Environment Customization. • Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, • Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, • Comparing Files. • Conclusion of Unit
3.	Unix file structure
	<ul style="list-style-type: none"> • Introduction of Unit • Grep: Operation, grep Family, Searching for File Content. • Sed :Scripts, Operation, Addresses, commands, Applications, grep and sed. • UNIX FILE STRUCTURE: Introduction to UNIX file system, inode (Index Node), file descriptors, • system calls and device drivers. • Conclusion of Unit
4.	Process and signals

	<ul style="list-style-type: none"> • Introduction of Unit • PROCESS AND SIGNALS: Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. • File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks. • Conclusion of Unit
5.	Inter process communication
	<ul style="list-style-type: none"> • Introduction of Unit • INTER PROCESS COMMUNICATION: Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget, msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands. • INTRODUCTION TO SOCKETS: Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications. • Awk and perl Programming: Awk pattern scanning and processing language, BEGIN and END patterns, Awk arithmetic and variables, Awk built in variable names and operators, arrays, strings, functions, perl; the chop() function, variable and operators, \$_ and \$. , Lists, arrays, regular expression and substitution, file handling, subroutines, formatted printing. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	<i>Advanced Programming in the UNIX Environment</i>	<i>W. Richard. Stevens</i>	3rd edition	Pearson Education
2.	Unix and shell Programming	<i>Stephen Kochan, Patrick Wood</i>	Latest	Sams
Reference Book				
1.	Linux System Programming, <i>Robert Love, O'Reilly, SPD.</i>			
2.	Advanced Programming in the UNIX environment, 2nd Edition, <i>W.R.Stevens</i> , Pearson Education.			
3.	UNIX Network Programming, <i>W.R. Stevens</i> , PHI. UNIX for Programmers and Users, 3rd Edition, <i>Graham Glass, King Ables</i> , Pearson Education			
Online Resources				
1.	https://www.tutorialspoint.com/unix/shell_scripting.htm			
2.	https://www.javatpoint.com/shell-scripting-tutorial			

COURSEOUTCOME:

Students will be able to:

- Handle Virtualization and able to handle partitions
- Learn the security using VMware products.
- Implementing Fault tolerance and High availability for the Virtual machines
- Implementing Citrix Server.
- Resource Optimization and monitoring.

A. OUTLINEOFTHECOURSE

<i>Unit No.</i>	<i>Title of The Unit</i>	<i>Time required for the Unit (Hours)</i>
1.	Introduction of Virtualization	08
2.	Templates and Cloning with vSphere Security	07
3.	vMotion & SVMotion with DRS & SDRS	08
4.	XenDesktop Architecture	07
5.	Setting Up XenDesktop Resources	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction of Virtualization
	<ul style="list-style-type: none"> • Introduction of Unit • Basic of vSphere & Virtualization :Introduction to VMware vSphere, Server Virtualization,Storage Virtualization, Network Virtualization • What is vSphere, ESXi & vCenter,vSphere Hypervisor(Free Version), Support & Upgrade of ESXi Free Version, Downloading, Installing & Configuring ESXi7,How to Download ESXi & vCenter 60 days Trial from VMware Website ,ESXi free version Support & Upgrade, Installing ESXi & DNS Deploying VCSA-Stage1,Configuring VCSA-Stage2 • Configuring vCenter :How to configure vCenter ,Creating Datacenter, Add Host,Create Cluster & Folders,ESXi Maintenance Mode • Licensing/Pricing of vSphere & vCenter :vSphere & vCenter Licensing, Assigning License to ESXi & vCenter, vSphere & vCenter Pricing,vSphere kits Licensing & Pricing • VM Creation & Modification:Create VM with Hot Add enabled, Methods of mounting ISO image to boot the VM, VM tools Installation,Hot Add of RAM, CPU & HDD,Hot Extend of HDD,Register/Unregister VM. • Conclusion of Unit.
2.	Templates and Cloning with vSphere Security
	<ul style="list-style-type: none"> • Introduction of Unit • Basics of Cloud Computing :Cloud Computing- IaaS, SaaS, PaaS, How Server is Created in AWS Cloud, Cloud is backbone of Virtualization • Templates, Cloning, Snapshot & Content Library,Exporting & Deploying OVF Template,Converting VM to Template,Creating Content Library, Adding ISO images and Templates in Content Library,VM files extension, Cloning Options, Guest OS Customization, Suspended State of VM, Difference between

	<p>Backup & Snapshot,Creating, Managing & Deleting Snapshot</p> <ul style="list-style-type: none"> • vSphere Security & Host Profile: Basics of vSphere Security, Adding AD Domain to SSO, Assigning permission to SSO user and AD user,Creating Roles,Creating and Applying Host Profiles,Reset ESXi root password using Host profile,Exporting & Importing Host Profile • vSphere Networking: vSphere Virtual Networking Terminologies, Discussion on Standard Switch, Virtual Machine Port Group & VMkernel Network Adapter,Creating Virtual Machine Port Group, VMkernel Network Adapter & Standard Switch. • Conclusion of Unit
3.	vMotion & SVMotion with DRS & SDRS
	<ul style="list-style-type: none"> • Introduction of Unit • vMotion & SVMotion:Live Storage Migration using SVMotion,Live Server Migration using vMotion,Live Server & Storage Migration without Shared Storage (vMotion+SVMotion) • DRS & SDRS: Load Balancing across ESXi hosts using DRS, Enhanced vMotion Compatibility (EVC), Automation Levels in DRS,DRS Rules to keep VM Separate & Together,DRS rule VM to Host,Power Saving using DPM,Load Balancing across Datastore using SVMotion,Automation levels in SDRS,SDRS VM Affinity & vmdk Anti-Affinity rules, Overriding SDRS cluster Setting for vmdk anti-affinity rule • High Availability & Fault Tolerance:Requirements & Licensing for High Availability(HA), Election of Master & Slave Host, Configuring & Testing HA, Primary & Secondary VM in FT, Configuring & Testing Fault Tolerance, • Conclusion of Unit
4.	Xen Desktop Architecture
	<ul style="list-style-type: none"> • Introduction of Unit • Citrix Server Instalation, Understanding the XenDesktop ,ArchitectureDETAILS, • XenDesktop Desktop Virtualization TechnologiesDETAILS,Infrastructure Components • Citrix Components,Designing a XenDesktop Implementation,Design Document,Setting Up the Hypervisio • Setting Up the Infrastructure Components. • Conclusion of Unit.
5.	Setting Up Xen Desktop Resources
	<ul style="list-style-type: none"> • Introduction of Unit • Setting Up XenDesktop Resources,Setting up XenDesktop Resources,Preparing the Master Virtual Machine • Setting Up a Server OS Master Image,Setting Up a Desktop OS Master Image,Creating a Machine Catalog,Creating a Delivery Group. • Setting Up Policies :Installing the Group Policy Management Feature,Configuring Printing Policies • Conclusion of Unit

C. RECOMMENDED STUDYMATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	Virtualization Essentials Paperback	Matthew Portnoy		Wiley Publications
2.	VMware Cookbook Paperback	Troy- Shroff		O'Reilly
3.	Building Virtual Machine Labs: A Hands-On Guide Second			
Reference Book				
1.	Nelson Ruest, Danielle Ruest, Virtualization, A Beginner's Guide, McGraw Hill, 2009, ISBN: 978-0-07-161401-6			

2.	Cloud Computing: Concepts Technology & Architecture By Thomes Erl
3.	Multi-Site Network and Security Services with NSX
Online Resources	
1.	Install and configure Citrix Virtual Apps and Desktops 7 2206
2.	VMware Workstation Player (tutorialspoint.com)

PRACTICAL

Code:BCACCA3201

Relational Database Management System Lab

1 Credits [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

- Effectively explain the underlying concepts of database technologies.
- Design and implement a database schema for a given problem-domain.
- Populate and query a database using SQL DML/DDDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
- Programming PL/SQL including stored procedures, stored functions, cursors, packages

A. LIST OF EXPERIMENTS:

1	To setup and removal phases of a Student database using the basic Data Definition Language (DDL) commands: 1. CREATE 2. ALTER 3. DROP 4. RENAME 5. TRUNCATE
2	The routine operation of the Employee database like retrieve, insert and modify by basic Data Manipulation Language (DML) commands: 1. INSERT 2. UPDATE 3. DELETE
3	To Retrieve data from one or more tables using DATA RETRIEVAL LANGUAGE (DRL) commands <ul style="list-style-type: none">• SELECT FROM• SELECT - FROM -WHERE• SELECT - FROM -GROUP BY• SELECT - FROM -ORDER BY• JOIN using SELECT - FROM - ORDER BY• JOIN using SELECT - FROM - GROUP BY• UNION• INTERSET• MINUS
4	DATA CONTROL LANGUAGE (DCL) and TRANSATIONAL CONTROL LANGUAGE (TCL) commands. i. Creating objects: tables, views, users, sequences, Collections etc. ii. Privilege management through the Grant and Revoke commands iii. Transaction processing using Commit and Rollback iv. Save points.
5	Queries for following functions i. Conversion functions (to_char, to_number and to_date) ii. string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), iii. date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
6	Simple queries: selection, projection, sorting on a simple table for employee database i. Small-large number of attributes ii. Distinct output values iii. Renaming attributes iv. Computed attributes v. Simple-complex conditions (AND, OR, NOT) vi. Partial Matching operators (LIKE, %, _, *, ?) vii. ASC-DESC ordering combinations viii. Checking for Nulls

7	To manipulate data items and returning the results using Group functions or Aggregate functions and Single Row or scalar functions: i. Group functions or Aggregate functions: Sum(), Avg(), Min(), Max() and Count() ii. Single Row or scalar function: Abs(), Power(), Sqrt(), Round(), Exp(), Greastest(), Least(), Mod(), Floor(), Sign() and Log().
8	Multi-table queries(JOIN OPERATIONS) i. Simple joins (no INNER JOIN) ii. Aliasing tables – Full/Partial name qualification iii. Inner-joins (two and more (different) tables) iv. Inner-recursive-joins (joining to itself) v. Outer-joins (restrictions as part of the WHERE and ON clauses) vi. Using where & having clauses
9	Write Nested queries to retrieve the name of each employee who has a dependent with the same first name and same sex as the employee using following Nested queries. i. In, Not In ii. Exists, Not Exists iii. Dynamic relations (as part of SELECT, FROM, and WHERE clauses)
10	Write a query to make a list of all project numbers for projects that involve an employee whose last name is ‘Smith’, either as a worker or as a manager of the department that controls the project using the following Set Oriented Operations i. Union ii. Difference iii. Intersection iv. Division
11	PL/SQL Programming using the following i. Programs using named and unnamed blocks ii. Programs using Cursors, Cursor loops and records
12	PL/SQL Programming using i. Creating stored procedures, functions and packages ii. Error handling and Exception iii. Triggers and auditing triggers

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Database System Concepts	S. Sudarshan, Henry F. Korth, AviSilberschatz	6 th Edition	McGraw Hill
2	SQL, PL/SQL	Ivan Bayross	Latest	Bpb
3	Oracle Complete Reference	Kevin Loney	Latest	Bpb

Reference Book	
1	PL/SQL-Best practices,BPB Publications, Steven Feuerstein
2	The Oracle Cook Book,BPB Publications, Liebschuty
Online Resources	
1	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2	https://nptel.ac.in/courses/106106093
3	https://www.coursera.org/learn/introduction-to-relational-databases

COURSE OUTCOME

Students will be able to:

- Write Python code, develop medium-difficulty applications in Python
- Implement Python programs with conditionals and loops
- Apply the concept of List and Dictionary.
- Implement Read and write data from/to files in Python
- Develop Python programs step-wise by defining functions

A. LIST OF EXPERIMENTS:

1	Write a python program to compute the GCD and LCM of two numbers.
2	Write python program to perform following operations on Lists: a) Create list b) Access list c) Update list (Add item, Remove item) d) Delete list
3	Write a Python program to remove the “i” th occurrence of the given word in a list where words repeat
4	Write a Python program to count the frequency of words appearing in a string using a dictionary.
5	Write Python program to create a dictionary with key as first character and value as words starting With that character.
6	Write a Python program to check if a substring is present in a given string.
7	Write a Python program to find the intersection and union of two lists.
8	Write a Python program to find the length of a list using recursion.
9	Write a Python program to read a file and capitalize the first letter of every word in the file.
10	Write a Python program to read the contents of a file in reverse order
11	Write a python program to create a package (Engg), sub -package(years),modules (sem) and create staff and student function to module
12	Write a python program to read 3 subject marks and display pass or failed using class and object

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Core Python Programming	Chun, JWesley	2007	Pearson,
2	Head First Python	Barry,Paul	2010	ORielly,

Reference Book

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|---|--|
| 1 | Learning Python Lutz, Mark, O Rielly, 2009 |
|---|--|

Online Resources

- | | |
|---|---|
| 1 | https://www.learnpython.org/ |
| 2 | https://realpython.com/start-here/ |

COURSE OUTCOME

Students will be able to:

- Use shell script to create files and handle text documents
- Create child processes, background process and zombies
- Familiarize basic concepts of shell programming
- Demonstrate use of system calls
- Demonstrate Inter process communication

A. LIST OF EXPERIMENTS:

1	Study and Practice on various commands like man, passwd, tty, script, clear, date, cal, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w.
2	Study and Practice on various commands like cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.
3	a) Write a Shell Program to print all .txt files and .c files. b) Write a Shell program to move a set of files to a specified directory.
4	c) Write a Shell program to display all the users who are currently logged in after a specified time. d) Write a Shell Program to wish the user based on the login time.
5	a) Simulate cat command. b) Simulate cp command.
6	a) Simulate head command. b) Simulate tail command.
7	a) Simulate mv command. b) Simulate nl command.
8	Write a program to handle the signals like SIGINT, SIGQUIT, SIGFPE.
9	Implement the following IPC forms a) FIFO b) PIPE
10	Implement message queue form of IPC.
11	Implement shared memory form of IPC.
12	Write a Socket program to print system date and time (Using TCP/IP).

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	UNIX Shell Scripting	Randal Michael	2003	Wiley
2.	Bash Cookbook	Carl Albing, JP Vossen	2017	O'Reilly
3.	Linux Command Line and Shell Scripting Bible	<u>Richard Blum</u> , <u>Christine Bresnahan</u>	2015	Wiley
Reference Book				
1.	Linux Command Line and Shell Scripting Bible 4th Edition by Richard Blum			
Online Resources				
1.	https://www.tutorialspoint.com/unix/shell_scripting.htm			
2.	https://www.javatpoint.com/shell-scripting-tutorial			

COURSE OUTCOME

Students will be able to:

- Apply Virtualization and able to handle partitions
- Learn the security using VMware products.
- Implementing Fault tolerance and High availability for the Virtual machines
- Implementing Citrix Server.
- Handle virtualization task.

A. LIST OF EXPERIMENTS:

1	Installing Esxi, Configuration of Esxi Using Devi
2	Login to Esxi Host Using Vsphere Client
3	Virtual networking with virtual switches
4	Creating a virtual machine and installing guest os on a VM
5	Configuration esxi host as ntp client
6	Installing Vcenter Server And Adding Esxi Host to Vcenter Server Inventory
7	Update Manager and Vsphere High Availability
8	Performance Monitoring With Host Profiles
9	Viewing Citrix ADC Logs and Network Traces (GUI)
10	Configuring External Syslog and Audit Policies (Citrix)
11	Viewing Citrix ADC Logs and Network Traces (CLI)
12	Configuring External Syslog and Audit Policies (CLI)

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Virtualization 101: Introduction to vSphere	A. s. solanki		TMH
Reference Book				
1	Computer Graphics C Version, Pearson Education India, Donald Hearn & M Pauline Baker			
Online Resources				
1	https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SCSA7022.pdf			
2	https://docs.hol.vmware.com/HOL-2022/hol-2210-01-sdc_pdf_en.pdf			

DEPARTMENTAL ELECTIVE

Code: BCAECA3111

Digital Marketing

3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Analyze Digital Marketing, its scope, objectives, opportunities and its challenges To help students develop create toward the commands of file system.
- Develop and create toward Digital Strategy building & its effectiveness.
- Know alternatives for Dynamic organization to ensure their success in highly competitive sale environment and to analyze the concept of Internet marketing and its application.
- Analyze the digital tools effectively for Social Media Marketing
- Develop an understanding toward E-mail marketing and its various application

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1	An overview of Digital Marketing	08
2	Digital Marketing Planning and Structure	07
3	Internet Marketing	08
4	Social Media Marketing	07
5	E-mail marketing and Applications	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	An overview of Digital Marketing <ul style="list-style-type: none">• Introduction to Digital Marketing• Different Ways to Market Your Business Online• Evaluation of Digital Marketing• Status of Digital Marketing in India• How Digital Marketing Works• Traditional vs. Digital Marketing• New Trends for Online Marketers• Digital Marketing Strategies• Impact of Digital Marketing on Business• Benefits of Digital Marketing• Drawbacks of Digital Marketing• Internet Marketing in India – Challenges• Conclusion of Unit
2.	Digital Marketing Planning and Structure <ul style="list-style-type: none">• Creating initial digital marketing plan• Target group analysis, In bound vs Outbound Marketing,• Content Marketing, Understanding Traffic, Understanding Leads• Strategic Flow for Marketing Activities.• WWW, Domains, Buying a Domain, Website Language & Technology, Core Objective of Website and Flow• One Page Website, Strategic Design of Home Page, Optimization of Web sites,

	<ul style="list-style-type: none"> • Application of Word Press in Digital Marketing, Application of CSS, HTML & Java Script for web page design • Conclusion of Unit
3.	Internet Marketing
	<ul style="list-style-type: none"> • Introduction of Unit • Marketing and Internet • Market place to Marketspace • Online buyer behavior, suppliers, Intermediaries Websites • Types of Websites, Web portals like: B2B, B2C,C2B,C2C, B2E(Business to Employee) • Social Networking • The promise and challenges of online marketing • The Indian Internet Marketing Mix. • Significance of Internet marketing. • Traditional vs. Online Marketing • Conclusion of Unit
4.	Social media Marketing
	<ul style="list-style-type: none"> • Introduction of Social Media Marketing • How Social media marketing works • Different components or Tools for Social Media Marketing • Facebook Marketing, Google Ad Words • YouTube Marketing, Content Marketing • Meme marketing, Affiliate Marketing • LinkedIn, Twitter, Instagram • Keywords with SEO marketing- On page Search Engine Optimisation, Off page SEO, why search • Engine marketing. • SEM and its application, Benefits of SEM • Blogging as a marketing strategy, Types of Blogs, What is Blogging? Benefits of Blogging. Pitfalls of Blogging. • Conclusion of Unit
5.	E-mail Marketing and Applications
	<ul style="list-style-type: none"> • Introduction of E-mail marketing • E-mail Marketing - What is it? Why do it and How? • Types of E-mail Marketing • Comparison to Traditional Mail • Opt-in E-mail Advertising • How to deal with Spam Filter • Choosing your metrics • Tracking Landing Pages • Top10 Benefits of E-mail Marketing • E-mail-Marketing Strategy Checklist • Effective E-mail Marketing Techniques • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Digital Marketing	Dave Chaffey	7 th	Pearson
2.	Marketing 4.0: Moving from Traditional to Digital Hardcover	Philip Kotler	Latest	Pearson

Reference Book

1	Digital Marketing, Dave Chaffey/Fiona Ellis, Pearson
2	Social Media Marketing All-In-One For Dummies, JanZimmerman and Deborah
3	Digital Marketing Strategy, Simon Kingsnorth, KoganPage

Online Resources

1	https://ejournal.lucp.net/index.php/ijrtbt/article/view/191
2	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3638929
3	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3308684

COURSE OUTCOME

Students will be able to:

- Gather and specify requirements of the software projects.
- Analyze software requirements with existing tools.
- Differentiate different testing methodologies.
- Apply the basic project management practices in real life projects.
- Work in a team as well as independently on software projects

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1	Software Process Models	8
2	Software Design	8
3	Introduction to Software Testing	10
4	Software Quality Management	8
5	Software Project Management	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Software Process Models
	<ul style="list-style-type: none"> • Introduction to Unit • How to develop software? • Different models - Water fall model – Prototyping – evolutionary model- Spiral model– RAD model - Agile models: Extreme Programming, and Scrum-pros and cons of each model • Requirements Analysis-Functional and Non-functional requirements, • Software Requirement Specification(SRS)–Decision tables–Decision Trees • Conclusion of the Unit
2.	Software Design
	<ul style="list-style-type: none"> • Introduction to Unit • Overview of design process: High-level and detailed design • Cohesion and Coupling Design Methodologies • Function–Oriented software design: Structured Analysis using DFD Structured Design using Structure • Architectural Design, Interface design, Component Level design • Software Reuse and Software Maintenance issues • Conclusion of the Unit
3.	Introduction to Software Testing
	<ul style="list-style-type: none"> • Coding, Code Review, documentation. • Testing: - Unit testing, Black-box Testing, White-box testing, • Cyclomatic complexity measure, coverage analysis, mutation testing, • Debugging techniques, Integration testing, System testing, • Regression testing. • Conclusion of the Unit
4.	Software Quality Management
	<ul style="list-style-type: none"> • Introduction to Unit • Overview of SQA Planning • Software configuration management

	<ul style="list-style-type: none"> • Study of ISO9000 &CMM • Software reverse engineering • Software reengineering • Conclusion of the Unit
5.	Software Project Management
	<ul style="list-style-type: none"> • Introduction toUnit • Various phases of Project Management –Planning– Organizing– Staffing– Directing and Controlling, Metrics for project size estimation • Software Project Cost Estimation–COCOMO models • Software Project Scheduling • CASEtools:CASEdefinitions–CASEClassifications–AnalysisandDesignWorkbenches,Testing Workbenches • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fundamentals of Software Engineering,	Rajib Mall	PHI	2018
2.	Software Engineering	I.Sommerville	Pearson Education	Asia

Reference Book	
1	Software engineering, Roger SPressman
2	An Integrated Approach to Software Engineering, Pankaj Jalote
Online Resources	
1	https://www.javatpoint.com/software-engineering-tutorial
2	https://www.geeksforgeeks.org/software-engineering/
3	https://www.tutorialandexample.com/software-engineering-tutorial

COURSE OUTCOME

Students will be able to:

- Describe the major technological, organizational, behavioral, and ethical issues facing today's information systems professional.
- Describe IT strategy formulation and explain its alignment with organizational strategy.
- Conduct research on and describe, several current and emerging technologies and explain their impact on corporate performance.
- Explain the difference between supporting a business with technology and driving a business with technology.
- Describe ways in which technology can provide an organization with competitive advantages

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1	Introduction to MIS	07
2	Information and Managerial Effectiveness	08
3	Information Systems	08
4	Information System for Functional Areas and Issues	07
5	New Trends in MIS	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to MIS
	<ul style="list-style-type: none"> • Introduction to unit • Concept, evolution and meaning of MIS; • Information system for competitive advantage; • Systems approach to problem solving; • Challenges in the development of MIS • MIS function in an organization. • Conclusion of Unit
2.	Information and Managerial Effectiveness
	<ul style="list-style-type: none"> • Introduction of Unit • Information and Managerial Effectiveness, Information as a corporate resource, • pervasiveness of information, types of information – operational, tactical and strategic; • Levels of management and information needs of management; Process of generation of information; • Quality of information; information systems for finance, marketing, manufacturing, • research and development and human resource areas. • Conclusion of Unit
3.	Information Systems
	<ul style="list-style-type: none"> • Introduction of Unit • Information Systems – Information systems and their role in Business systems, • changing role of information systems, users of information systems; • Types of information systems – transaction processing systems, • MIS decision support systems, executive support system; • Enterprise Resource Planning (ERP) system, • Business expert system. • Conclusion of Unit
4.	Information System for Functional Areas and Issues
	<ul style="list-style-type: none"> • Introduction of Unit

	<ul style="list-style-type: none"> • Information System for Functional Areas – Information for Financial – Marketing Inventory Control – Production and HR Functions, • Security Issues Relating to Information Systems, • threats to information systems, Vulnerability, risk and control measures. • Conclusion of Unit
5.	New Trends in MIS
	<ul style="list-style-type: none"> • Introduction of Unit • Cloud computing, Big data, CRM technology for Business, • Data ware housing and artificial intelligence, • Near field Communication, Super Beam (Only concepts) • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	“Management Information Systems: Managerial Perspectives”	D P Goyal	Second Edition	Macmillan
2.	“Management Information System: Conceptual Foundations – Structure and Development”	Gordon Davis and Margrethe Olson	Fourth Edition	Pearson
3.	“Management Information Systems: Managerial Perspectives”	D P Goyal	Second Edition	Macmillan

Reference Book	
1	Management Information Systems DANTES/DSST Test Study Guide, Breely Crush Publishing, kindle edition.
2	Management Information Systems Author(s):Jawadekar, W. S. Edition: 2nd edition Publisher: Tata McGraw Hill (TMH)
Online Resources	
1	https://www.coursera.org courses
2	https://www.tutorialspoint.com mis tutorial
3	https://www.javatpoint.com/mis

COURSE OUTCOME

Students will be able to:

- Demonstrate depth of understanding, observing complexity, improve insight and develop independent thought and persuasiveness
- Determine the main ideas of the text by using key details and compare & contrast the most important points with the help of their perspective
- Practice the qualities of writing style by applying the concepts of sentence conciseness, accuracy, readability, coherence and by avoiding wordiness or ambiguity.
- Distinguish words and phrases as per their intonation patterns and interpret the audios based on different situations
- Demonstrate the understanding of impactful conversational skills, presentation skills & telephonic conversation by considering the need of the audience

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1	Intrapersonal/Interpersonal Skills	6
2	Reading Skills	4
3	Writing Skills	6
4	Listening Skills	4
5	Speaking Skills	5

LIST OF ACTIVITIES

1.	Self – Awareness & Self-Introduction
2.	Goal Setting: Ambition induced, interest induced or environment conditioned
3.	Cultivating Conversational Skills
4.	Role Plays : Selection of varied plots, characters & settings
5.	Reading skills I: Newspaper Reading & General Article Reading
6.	Writing Skills I: Story Making by jumbled words
7.	Understanding and Applying Vocabulary
8.	Listening Skills I: Types and practice by analyzing situational listening
9.	Speaking Skills I: JAM
10.	PowerPoint Presentation Skills-I
11.	Telephonic Etiquettes and Communication
12.	Recognizing, understanding and applying communication style (Verbal/Non-Verbal)

COURSE OUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -III, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

:

Code	Activity	Hours	Credits
BCACCA3601	Talent Enrichment Programme (TEP)-III	2	1
	Library / MOOC / Online Certificate Courses	2	
	Non Syllabus Project (NSP) / Industry Visit / CRT	2	

Semester-IV

SEMESTER IV

DEPARTMENT CORE COURSES

Code: BCACCA4101

Big Data Analysis

3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Provide HDFS Concepts and Interfacing with HDFS
- Access and Process Data on Distributed File System
- Manage Job Execution in Hadoop Environment
- Recognize the components of Hadoop and Hadoop Eco-System
- Apply Machine Learning Techniques using R

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Big Data And Hadoop	07
2.	HDFS(Hadoop Distributed File System)	08
3.	Map Reduce	08
4.	Hadoop Eco System	07
5.	Data Analytics with R	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Big Data And Hadoop
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Big Data ,Big Data Characteristics • Types of Digital Data, Introduction to Big Data, Big Data Analytics, • Relationships and Representations, Graph Databases. • History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, • Analysing Data with Hadoop, Hadoop Streaming, • Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets. • Conclusion of Unit
2.	HDFS(Hadoop Distributed File System)
	<ul style="list-style-type: none"> • Introduction of Unit • The Design of HDFS, HDFS Concepts, Command Line Interface, • Hadoop file system interfaces, Data flow, • Data Ingest with Flume and Scoop and Hadoop archives, • Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures • Conclusion of Unit
3.	Map Reduce
	<ul style="list-style-type: none"> • Introduction of Unit • Anatomy of a Map Reduce Job Run, Failures, • Job Scheduling, Shuffle and Sort, • Task Execution, Map Reduce Types and Formats, Map Reduce Features. • Conclusion of Unit
4.	Hadoop Eco System

	<ul style="list-style-type: none"> • Introduction of Unit • Pig : Introduction to PIG, Execution Modes of Pig, • Comparison of Pig with Databases, Grunt, Pig Latin, • User Defined Functions, Data Processing operators. Hive : Hive Shell, • Hive Services, Hive Metastore, Comparison with Traditional Databases, • HiveQL, Tables, Querying Data and User Defined Functions. Hbase:HBasics, Concepts, Clients, Example, Hbase V/S RDBMS. • Big SQL : Introduction • Conclusion of Unit
5.	Data Analytics with R
	<ul style="list-style-type: none"> • Introduction of Unit • Machine Learning : Introduction, Supervised Learning, • Unsupervised Learning, Collaborative Filtering. • Big Data Analytics with BigR. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Hadoop: The Definitive Guide	Tom White	Third Edition	O'reily
2.	Big Data Analytics	Seema Acharya, Subhasini Chellappan	2015	Wiley
Reference Book				
1.	Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.			
2.	Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)			
3.	Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R			
Online Resources				
1.	http://www.bdbanalytics.ir/media/1121/big-data-analytics_turning-big-data-into-big-money.pdf			
2.	https://www.techtarget.com/searchbusinessanalytics/definition/big-data-analytics			
3.	https://www.tutorialspoint.com/hadoop/hadoop_big_data_overview.htm			

COURSE OUTCOME

Students will be able to:

- Apply Divide and conquer. Greedy algorithm design techniques.
- Know the dynamic programming concept with solving real word problem
- Work on Pattern matching algorithms.
- Apply randomize algorithms
- Wok for different class of algorithms and difference between them.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction	06
2.	Dynamic Programming, Branch and Bound	06
3.	Pattern Matching and Assignment Problem	08
4.	Randomized Algorithm	08
5.	NP-Hard and NP-Complete Problem	08

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction
	<ul style="list-style-type: none"> • Introduction to Unit • Algorithm Specification, Algorithm Complexity and Order Notations. • Divide and Conquer Method: General Method , Binary Search, Merge Sort, Quick sort and stresses' matrix multiplication algorithm. • Greedy Method: General method, Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spaning Tree, Krushkal Algorithm, Prims Algorithm • Conclusion of Unit
2.	Dynamic Programming, Branch and Bound
	<ul style="list-style-type: none"> • Introduction to Unit • Dynamic Programming: Matrix Chain Multiplication, Longest Common subsequence • Subseuenceand0/1KnapsackProblem, Allpairs shortest path, Flow shop scheduling • Branch And Bound: Traveling Salesman Problem, Bounding, FIFO Branch and Bound, • Backtracking: The8-queensproblem, Hamiltonian cycles Comparison between Dynamic, Backtracking and Branch Bound • Conclusion of Unit
3.	Pattern Matching and Assignment Problem
	<ul style="list-style-type: none"> • Introduction toUnit • Pattern Matching Algorithms: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms. • Assignment Problems: Formulation of Assignment and Quadratic assignment Problem. • Conclusion of Unit.
4.	Randomized Algorithm
	<ul style="list-style-type: none"> • Introduction of Unit. • ProbabilisticAnalysis&RandomizedAlgorithms: Las Vegas algorithm, Monte Carlo algorithms for Min-Cut, randomized algorithm for 2- SAT. • Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity

	<ul style="list-style-type: none"> • Assignment problems. • Conclusion of Unit
5.	NP-Hard and NP-Complete Problem
	<ul style="list-style-type: none"> • Introduction of Unit. • Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Proving NP- Complete Problems - Satisfiability problem and Vertex Cover Problem. • Approximation Algorithms for Vertex Cover and Set Cover Problem • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fundamentals of Computer Algorithms	E.Horowitz & S.Sahani	Latest	Galgotia Publications
2.	Introduction to Algorithms	Corman, Leiserson & Rivest	Latest	MIT Press
3	Algorithm Analysis & Design	Goodrich, Tamassia	Latest	Wiley
4.	Introduction To The Design & Analysis of Algorithm	Anany Levitin	Latest	Pearson Education
Reference Book				
1.	The Algorithm Design Manual by Steve S. Skiena			
2.	Algorithms by Robert Sedgewick & Kevin Wayne			
Online Resources				
1.	http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms			
2.	http://courses.csail.mit.edu/6.006/spring11/notes.shtml			

COURSE OUTCOME

Students will be able to:

- Gain fundamental understanding of AWS cloud technologies
- Start a Windows or Linux server in the cloud with its own private address
- Start up a CRM / Word Press / etc. website hosted in cloud
- To able to security of Web Services and implement in use
- Setup a load-balancer in the cloud

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Cloud Computing and Amazon Web Services	08
2.	Introduction to EC2	10
3.	Web Applications	10
4.	AWS Security	8
5.	AWS Storage	10

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Cloud Computing and Amazon Web Services
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), • Cloud Deployment Models (Private, Public, Hybrid and Community), • Cloud Computing Security, • Introduction to Amazon Web Services, AWS Storage Options, • AWS Compute Options, AWS Database Options, AWS Workflow Automation • AWS Orchestration Options, AWS Systems Management and Monitoring Options, • AWS Virtual, Private Cloud Introduction • Conclusion of Unit
2.	Introduction to EC2
	<ul style="list-style-type: none"> • Introduction of Unit • 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 • Conclusion of Unit
3.	Web Applications
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Elastic Beanstalk, Deploying Scalable Application On AWS, • Selecting And Launching An Application Environment,

	<ul style="list-style-type: none"> • Provisioning Application Resources with Cloud formation, • Introduction to Cloud Watch, Describe Amazon Cloud Watch metrics and alarms, • AWS Messaging Services(SNS,SQS,SES). • Conclusion of Unit
4.	AWS Security
	<ul style="list-style-type: none"> • Introduction of Unit • 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 • Conclusion of Unit
5.	AWS Storage
	<ul style="list-style-type: none"> • Introduction of Unit • 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, • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cloud Computing: Principles and Paradigms	RajkumarBuyya, James Broberg, Andrzej M. Goscinski		John Wiley and Sons Publications
2.	Cloud Computing For Dummies	Fern Halper,Robin Bloor		
Reference Book				
1.	Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008			
2.	Cloud Computing: Web-Based Applications That Change the Way You Work by Micheal Miller			

COURSE OUTCOME

Students will be able to:

- To know the different types of Network and their configuration.
- Troubleshoot and configure the network and its security.
- Allot address to different nodes and network.
- Configure Routers for network.
- Configure different types of Routers.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Networking Fundamentals	07
2.	Ethernet LANs and Switches	08
3.	IP V4 Addressing and Subnetting	08
4.	LAN Routing	09
5.	Infra-structure Services	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Networking Fundamentals
	<ul style="list-style-type: none"> • Introduction of Unit • The TCP/IP and OSI Networking Models • Fundamentals of Ethernet LANs, • Fundamentals of WANs, Fundamentals of IPv4 & IPv6 Addressing, • Fundamentals of TCP/IP Transport and Applications • Conclusion of Unit
2.	Ethernet LANs and Switches
	<ul style="list-style-type: none"> • Introduction of Unit • Building Ethernet LANs with Switches, • Cisco LAN Switches, Configuring Ethernet Switching, • Configure, verify, and troubleshoot VLANs (normal range) spanning multiple switches, • Configure, verify, and troubleshoot interswitch connectivity, • Configure, verify, and troubleshoot port security • Conclusion of Unit
3.	IP Version 4 Addressing and Subnetting
	<ul style="list-style-type: none"> • Introduction of Unit • Perspectives on IPv4 Subnetting, Analyzing Classfull IPv4 Networks • Analyzing Subnet Masks, Analyzing Existing Subnets, • Implementing IP Version 4: Operating Cisco Routers, Configuring • IPv4 Addresses and Routes, Implementing Ethernet Virtual LANs, • Troubleshooting Ethernet, LANs • Spanning Tree Protocol Concepts, Troubleshooting LAN Switching • Conclusion of Unit

4. LAN Routing	<ul style="list-style-type: none"> • Introduction of Unit • Configure IPv4 Routing, Configure and Verify Host Connectivity, • Advanced IPv4 Addressing Concepts, Describe the boot process of Cisco IOS routers; • Operation status of a serial interface;Manage Cisco IOS files; • Routing and Routing Protocols; OSPF (multi-area); EIGRP (single AS); Passive Interface. • Conclusion of Unit
5. Infra-structure Services	<ul style="list-style-type: none"> • Introduction of Unit • Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security, • Network Address,Translation, • Recognize high availability (FHRP); Describe SNMP v2 and v3, • Configure and verify DHCP on a router. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	CCNA Cisco Certified Network Associate: Study Guide			Wiley
2.	CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition			Pearson
Reference Book				
1.	Web Application Security, A Beginner's Guide Bryan Sullivan and Vincent Liu, McGraw Hill; 2012			
Online Resources				
1.	https://www.edx.org/learn/computer_Security			

PRACTICAL

Code: BCACCA4201

Big Data Lab

1Credit [LTP: 0-0-2]

Course Outcome:-

Students will be able:

- Identify the key issues in big data management and experiment with Hadoop framework.
- Develop problem solving and critical thinking skills in fundamental enable techniques like Hadoop & MapReduce.
- Construct and Explain with structure and unstructured data by using NoSQL commands.
- Implement fundamental enabling techniques and scalable algorithms for data streaming.

A. LIST OF EXPERIMENTS:

1	Hadoop Installation: Ubuntu & THEL 9 Operating System in stand-alone mode
2	File Management tasks in Hadoop
3	Implement the following Data structures in Java: <ul style="list-style-type: none">• Linked Lists• Stacks• Queues• Set• Map
4	Word Count Map Reduce program to understand Map Reduce
5	Implement the following file management tasks in Hadoop: <ul style="list-style-type: none">• Adding files and directories• Retrieving files• Deleting files
6	Implement Matrix Multiplication with Hadoop Map Reduce
7	Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
8	Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes
9	Weather Report POC-Map Reduce Program to analyses time-temperature statistics and generate report with max/min temperature.
10	Implementing Matrix Multiplication with Hadoop Map Reduce
11	Pig Latin scripts to sort, group,join,project, and filter your data.
12	Hive Databases: Tables,Views,Functions and Indexes

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Hadoop in Practice	Alex Holmes	2014	Wiley India
2.	Big Data	Black Book	2016	DT Editorial Services
3.	Big Data and Hadoop	V.K. Jain	2017	Khanna Publishers
Reference Book				
1.	Hadoop Practice Guide,"Jisha Mariam Jose"			
2.	Hadoop: The Definitive Guide ,"Tom White",O'Relly			
Online Resources				
1.	https://ia600201.us.archive.org/7/items/HadoopInPractice/Hadoop%20in%20Practice.pdf			

Course Outcome: -

Students will be able to:

- Apply divide and conquer method to implement quick sort, merge sort, linear search, and Binary search in C.
- Implement job sequencing using greedy method.
- Find the minimum cost of spanning tree.
- Implement the dynamic programming using branch and bound method.
- Implement the NP-Hard, NP-.Complete problem.

A. LIST OF EXPERIMENTS:

1	Write a C program to implement the Stack using arrays. Write Push(),Pop(),and Display() methods to demonstrate its working.
2	Write a C program to sort a list of elements using the quick sort algorithm. The elements can be read from a file.
3	Write a C program to implement a Merge sort algorithm to a list of elements for different values of n and determine the time required to sort the elements.
4	Find the minimum cost of spanning tree in C using Prim's algorithms.
5	Find the minimum cost of spanning tree in C using Kruskal's algorithm.
6	Implement 0/1 Knapsack problem using Dynamic Programming in C.
7	Write a C program to find the shortest paths between nodes in a graph using Dijkstra's algorithm.
8	Write a C program to Print all the nodes reachable from a starting node in a digraph using BFS method. Check whether a graph is connected or not using DFS method.
9	Write a C program to implement all pairs shortest paths problem using Floyd's algorithm.
10	Write a C program to implement N Queen's problem using Back Tracking.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Mastering Algorithms with C	Kyle Loudon	Latest	O'Reilly
2.	Algorithms Illuminated (Part 3): Greedy Algorithms and Dynamic Programming	Tim Roughgarden	2014	Kindle
Reference Book				
1.	Data Structures and Algorithms, Made Easy by NarasimhaKarumanchi, Kindle Edition			
Online Resources				
1.	https://www.sanfoundry.com/c-program			
2.	https://www.thecrazyprogrammer.com/2015/03/c-program-for-n-queens-problem-using-backtracking.html			

Course Outcome: -

Students will be able to:

- Apply and use Cloud Web Services in Real life
- Make Comparison of Different Web Services
- Implement and use different coefficient
- Visualize data with appropriate visual techniques
- To able to operate Cloud Web Services

A. LIST OF EXPERIMENTS:

1	Get Example to Apply Cloud Web Service in Real Life
2	Take knowledge and use of amazon Web Service
3	Take Knowledge and use of Google Web Service
4	Make Comparison of Different Web Services
5	Tokenize the sentence into words for the further analysis
6	Normalize the sentence to eliminate the unwanted punctuation, converting into lower case or upper case of the entire document, expanding abbreviation, numbers into words and canonicalization.
7	Apply similarity measures using Jaccard's Coefficient or Tanimoto coefficient
8	Apply similarity measures using the Smith Waterman distance
9	For the given data what is the maximum number of words used. Get the output for the frequently occurred word in the given data?
10	Visualize the given text data with appropriate visual techniques?
11	Get the word cloud for the given data and interpret where the management need to give highest attention to get the better income?
12	Develop a back-off mechanism for Maximum Likelihood Estimate (MLE)

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cloud Computing: Principles and Paradigms	RajkumarBuyya, James Broberg, Andrzej M. Goscinski		John Wiley and Sons Publications
2.	Machine Learning in the AWS Cloud	Abhishek Mishra	1 st	
3.	Effective DevOps with AWS			
Reference Book				
1.	Mastering AWS Security, "Albert Anthony", Packt			
2.	Amazon Web Services in Action 2nd Edition			
Online Resources				

1.	https://www.tutorialspoint.com/amazon_web_services/index.htm
2.	https://www.w3schools.com/aws/index.php

Course Outcome:-

Students will be able to:

- Troubleshoot and configure the network and its security.
- Allot address to different nodes and network.
- Configure Routers for network.
- Configure different types of Routers.
- To able to handle any kind of network

A. LIST OF EXPERIMENTS:

1	Executing of Switch Configuration - Basic Commands
2	Recognize Switch Configuration - Switch Port Security
3	Schematize Router - Configuration
4	Demonstrate Configuration of IP Address for a Router
5	Classify Setting up of Passwords
6	Compare PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication
7	Differentiate Configuration of Static and Dynamic Routing
8	Analyze Configuration of Default Route
9	Execute Implementation of EIGRP
10	Execute Implementation of OSPF
11	Interpret VLAN Configuration
12	Show Switch Troubleshooting

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	CCNA Cisco Certified Network Associate: Study Guide			Wiley
Reference Book				
1.	UNIX and Linux System Administration Handbook 5th Edition			
Online Resources				
1.	https://www.omniseccu.com/index.php			
2.	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwid6LrU6uP4AhUVGrcAHUS1AbwQFnoECckQAQ&url=https%3A%2F%2Fwww.javatpoint.com%2Fcomputer-network-tutorial&usg=AOvVaw2jEzsmh3wyIR9_RZIE9F3c			

DEPARTMENT ELECTIVE

Code:BCAECA4111

Information Security Fundamental

3Credit[LTP:3-0-0]

COURSE OUTCOME

Students will be able to:

- Identify and analyze security problems in computer systems and networks.
- Explain how standard security mechanisms work.
- Develop security mechanisms to protect computer systems and networks.
- Write programs that are more secure.
- Use cryptography algorithms and protocols to achieve computer security

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Information Security	07
2.	Encryption and Authentication Techniques.	08
3.	Risk Management	08
4.	Internet Security.	07
5.	Network Security	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Information Security
	<ul style="list-style-type: none"> • Introduction to Information Security: Attacks, Vulnerability, Security Goals, Security Services and mechanisms, Conventional Cryptographic Techniques: Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Steganography . • Conclusion of the Unit
2.	Encryption and Authentication Techniques.
	<ul style="list-style-type: none"> • Symmetric and Asymmetric Cryptographic Techniques : DES, AES, RSA algorithms, International Data Encryption Algorithm (IDEA), Digital Certificates, Private Key Management, The PKIX Model Authentication and Digital Signatures • Conclusion of the Unit
3.	Risk Management
	<ul style="list-style-type: none"> • Key management – Kerberos, Program Security : Non-malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels • Conclusion of the Unit
4.	Internet Security.
	<ul style="list-style-type: none"> • Internet Security Protocols: Introduction, Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), SSL Versus SET, 3D Secure Protocol, Electronic Money, Email Security Wireless Application Protocol (WAP) Security • Conclusion of the Unit
5.	Network Security
	<ul style="list-style-type: none"> • Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP,S/MIME

- Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Information Security Risk Analysis	Thomas R.Peltier	3 rd	Auerbach
2.	Mark Stamp's Information Security: Principles and Practice(WIND)	Deven N.Shah,	Latest	Wiley
3.	Information Systems Security: Security Management, Metrics, Frameworks and Best Practices	Nina Godbole	1 st	Wiley

Reference Book

1.	Security in Computing, Fourth Edition, by Charles P. P fleeger, Pearson Education
2.	Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson
3	Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.

Online Resources

1.	https://www.sans.org/cyber-security-courses/introduction-cyber-security/
2.	https://nptel.ac.in/courses/106106129

COURSE OUTCOME

Students will be able to:

- Identify the different project contexts and suggest an appropriate management strategy.
- Practice the role of professional ethics in successful software development.
- Identify and describe the key phases of project management.
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Software Project Management	07
2.	Project Analysis	08
3.	Activity Planning and Scheduling	08
4.	Risk Management, Resource allocation & Monitoring and control	07
5.	Managing Contracts and people	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Software Project Management
	<ul style="list-style-type: none"> • Introduction of Unit • Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, • categorizing SPs, Project management cycle, SPM framework, types of project plan. • Conclusion of Unit
2.	Project Analysis
	<ul style="list-style-type: none"> • Introduction of Unit • strategic assessment, technical assessment, economic analysis: Present worth, • future worth, annual worth, internal rate of return (IRR) method, • benefit-cost ratio analysis, including uniform gradient cash flow and comparison of mutually exclusive alternatives. • Conclusion of Unit
3.	Activity Planning and Scheduling
	<ul style="list-style-type: none"> • Introduction of Unit • Objectives of activity planning, Work breakdown structure, Bar chart, Network planning model: Critical path method (CPM) • Program evaluation and review technique (PERT) • Precedence diagramming method (PDM), Shortening project duration, Identifying critical activities. • Conclusion of Unit
4.	Risk Management, Resource allocation & Monitoring and control
	<ul style="list-style-type: none"> • Introduction of Unit • Nature and identification of risk, risk analysis, evaluation of risk to the schedule using Z-values • Identifying resource requirements, resource allocation, resource smoothing and resource balancing • Collecting data, visualizing progress, cost monitoring, earned value analysis, project control • Conclusion of Unit
5.	Managing Contracts and people
	<ul style="list-style-type: none"> • Introduction of Unit

- Types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance
- Managing people and organizing terms: Introduction, understanding behavior,
- Organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods,
- Motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises,
- Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Software Project Management	Rajiv Mall	5 th	SE
2.	Software Project Management	Barry Boehm	3 rd	Pearson
Reference Book				
1.	Software Project Management, Bob Hughes and mike cotterel, 5 th edition			
Online Resources				
1.	https://mrcet.com			
2.	https://www.edutechlearners.com			
3.	https://www.e-booksdirectory.com			

COURSE OUTCOME

Students will be able to:

- Describe the impact of E-commerce on business models and strategy.
- Describe the major types of E-commerce.
- Explain the process that should be followed in building an E-commerce presence.
- Identify the key security threats in the E-commerce environment.
- Describe how procurement and supply chains relate to B2B E-commerce.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to E-Commerce	07
2.	The Network Infrastructure for E-Commerce	08
3.	E-Commerce Security and Fraud Issues and Protection	08
4.	E-payment systems	07
5.	Introduction to Management Information System	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to E-Commerce
	<ul style="list-style-type: none"> • Introduction of Unit • Definitions and Concepts; Defining E-Business; Pure Versus Partial EC; EC Framework • Classification of EC; Benefits of E-Commerce; Electronic Markets • Role of Internet and Web in E-Commerce; • The Limitations and Barriers of EC; Social Networks and Social Network Services; • Conclusion of Unit
2.	The Network Infrastructure for E-Commerce
	<ul style="list-style-type: none"> • Introduction of Unit • The Network Infrastructure for E-Commerce: Introduction to Information Superhighway (I-Way) • Components of the I-Way, Internet as a network infrastructure. Wireless Application Protocol: Wireless Application Protocol (WAP); • Architecture of WAP; Working of WAP; Wireless Technologies: ADSL, • WiMAX, WLAN, WMAN Wi-Fi, UMTS (3G), LTE (4G), (5G NR) • Security Issues related to Wireless Communications. • Conclusion of Unit
3.	E-Commerce Security and Fraud Issues and Protection
	<ul style="list-style-type: none"> • Introduction of Unit • Basic Ec Security Terminology, The Threats, Attacks, and Attackers, EC Security Requirements: Confidentiality, Integrity and Availability, Authentication, Authorization and Nonrepudiation; • Technical Malware attack: Viruses, Worms, and Trojan Horses, Heartbleed, Distributed Denial of Service, Cryptblocker, Page hijacking, Botnets, Malvertising, ransom ware, sniffing, Non-Technical malware attack: Social Phishing, Pharming, Identity Theft and Identify Fraud, Spam attacks; • EC defense Strategy: access control(Authorization and Authentication, Biometric Systems), encryption and PKI (Symmetric Key Encryption, Asymmetric Key Encryption, Certificate Authority(CA), Secure Socket Layer(SSL) • Securing e-commerce networks: Firewalls, Virtual Private Networks, Intrusion Detection Systems(IDS), intrusion prevention System(IPS). • Conclusion of Unit

4.	E-payment systems
	<ul style="list-style-type: none"> • Introduction of Unit • Online payment cards (credit cards, charge cards, debit cards, smart cards), processing cards in online, credit card payment procedure • e-micro payments, e-checking and its processing in online. Automated clearing house (ACH) network, mobile payments (Digital wallet) • mobile payment participants and issues, international payments, • Emerging EC payment systems and issues: crypto currency, virtual currency. A case study of emerging trends in online payment system in Nepal. • Conclusion of Unit
5.	Introduction to Management Information System
	<ul style="list-style-type: none"> • Introduction of Unit • Data, information, computer based information system (CBIS), Information System Resources, Management information system, Transaction processing (TPS) system, • decision support system (DSS), and executive information system (EIS), SCM, CRMS and International Systems: Introduction, • Supply Chain Management Systems, Customer Relationships Management Systems, • Enterprise systems and Challenges of Enterprise Systems Implementations- Managing the implementation, International Information Systems-Outsourcing and off-shoring. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	E-Commerce-Strategy, Technologies & Applications	by David Whitley,		TMH
2.	E-Commerce- The cutting edge of business	by Kamlesh K. Bajaj,		TMH
Reference Book				
1.	E-Commerce through ASP by W Clarke- BPB			
Online Resources				
1.	https://ecommerceguide.com			
2.	https://ecommerce-platforms.com			

COURSE OUTCOME

Students will be able to:

- Develop the ability to identify difficult sounds, words and phrases to strengthen listening and applying these improved skills in spoken communication.
- Cultivating knack for reading and writing by understanding the nuances of sentence structure and presentation style.
- Comprehend negotiation and Identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain.
- Develop a heightened awareness of the potential of digital communication and apply their knowledge in creating documents considering the needs of the netizens.
- Propose their outlook through exposure to new and different experiences and ideas and enrich their understanding of the issues under discussion.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to E-Commerce	07
2.	The Network Infrastructure for E-Commerce	08
3.	E-Commerce Security and Fraud Issues and Protection	08
4.	E-payment systems	07
5.	Introduction to Management Information System	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to E-Commerce
	<ul style="list-style-type: none"> • Introduction of Unit • Advanced Listening & Speaking Skills • Conclusion of Unit
2.	The Network Infrastructure for E-Commerce
	<ul style="list-style-type: none"> • Introduction of Unit • Advanced Reading & Writing Skills • Conclusion of Unit
3.	E-Commerce Security and Fraud Issues and Protection
	<ul style="list-style-type: none"> • Introduction of Unit • Art of Negotiation Skills • Conclusion of Unit
4.	E-payment systems
	<ul style="list-style-type: none"> • Introduction of Unit • Email Etiquettes • Conclusion of Unit
5.	Introduction to Management Information System
	<ul style="list-style-type: none"> • Introduction of Unit • Group Discussion • Conclusion of Unit

A. LIST OF EXPERIMENTS:

1	Listening Skills II: Analysis of videos/audios by famous personalities
2	Speaking Skills II: Extempore, Debate etc.
3	Public Speaking: Key Concepts, Overcoming Stage Fear
4	Story-Telling Skills: Techniques of Story Telling, Prompts for story creation
5	Situational Conversational Skills
6	PowerPoint Presentation Skills-II
7	Reading Skills II: Technical Writings, Research Papers& Articles
8	Writing Skills II: Blog Writing &Review Writing
9	Picture Perception & Discussion
10	Art of Negotiation: Identify the qualities of successful and unsuccessful negotiators. Identify different negotiation situations to practice during class.
11	Email Etiquettes
12	Group Discussion: Dos &Don'ts, Informal GD

COURSE OUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -IV, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Fourth Semester are as follows:

:

Code	Activity	Hours	Credits
BCACCA3601	Talent Enrichment Programme(TEP)-IV	4	1
	Library / MOOC / Online Certificate Courses		
	Non Syllabus Project (NSP) / Industry Visit / CRT		

Semester-V

SEMESTER V

DEPARTMENT CORE COURSES

Code: BCTCCA5101

Cloud Deployment

3 Credits [LTP: 3-0-0]

COURSE OUTCOME:-

Students will be able to:

- To gain fundamental understanding of cloud technologies and cloud deployment
- 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 setup a load-balancer in the cloud.
- To able to handle Virtual Private Cloud

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to Cloud Deployment and Services	08
2.	Introduction to EC2	08
3.	S3, Cloudwatch, Elastic Beanstalk	08
4.	AWS Storage, Elasticity and AWS Networking	07
5.	Virtual Private Cloud (Vpc)	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Cloud Deployment and Services
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Cloud Deployment Models (Private, Public, Hybrid And Community), • Cloud deployment model Security, Differences among different Cloud Deployment Model • Advantages and disadvantages of various cloud computing Deployment model • Google Cloud Platform, Data Center-Based Cloud, Cloud Services Pricing Concepts, Cloud Pricing over Different Deployment Model • Conclusion of Unit
2.	Introduction to EC2

	<ul style="list-style-type: none"> • Introduction of Unit • Introduction To EC2, Instance Types And Uses, Autoscaling Instances, • Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images Off Of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Creating A Web Server Using Ec2, • Elastics Block Storage (EBS), Elastic IPS, Route 53 DNS System
	<ul style="list-style-type: none"> • Conclusion of Unit
3.	S3, Cloudwatch, Elastic Beanstalk
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction To S3, Buckets And Objects, Security, Creating A Web Server Using S3Endpoints, • Introduction To Cloudwatch, Creating Alarm Notifications, Autoscaling Instances, Deploying Scalable Application On AWS, • Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation. • Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance, Identify what is Cloud Formation, Describe Amazon Cloud Watch metrics and alarms, Describe Amazon Identity and Access Management (IAM) • Conclusion of Unit
4.	AWS Storage, Elasticity and AWS Networking
	<ul style="list-style-type: none"> • Introduction of Unit • Amazon Storage, S3 Storage Basics, Managing Voluminous Information with EBS, • Glacier Storage Service, AWS Networking: Networking Basics, VLAN Basics, Basics of AWS VLANs, AWS Network IP Addressing and Mapping • Conclusion of Unit
5.	Virtual Private Cloud (Vpc)
	<ul style="list-style-type: none"> • Introduction of Unit • Load Balancers And Availability Zones, Elastic Network Interfaces (ENI), Setting Up VPC And Internet Gateway, Setting Up a Security Group, Launching And EC2 Instance And Assigning An ENI, Setting Up A VPN, Setting Up A Customer Gateway For VPN, • Setting Up Dedicated Hardware For VPC <ul style="list-style-type: none"> 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) • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

Text Books:	
1.	Cloud Computing: Principles and Paradigms
2.	Cloud Deployment Models A Complete Guide – 2019
Reference Book	
1.	Cloud Computing Simplified
2.	Practical Cloud Security
Online Resources	
1.	https://cloud.google.com/deploy/docs/tutorials
2.	https://www.javatpoint.com/cloud-deployment-model

COURSE OUTCOME

Students will be able to:

- The fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges.
- The basic ideas and principles in data center Migration; cloud development techniques.
- The basic ideas and principles in data center Migration and cloud services deployment considerations.
- Cloud storage technologies and relevant distributed file systems.
- To able to handle Data Center Virtualization.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Migrating into a Cloud	7
2.	Cloud Migration Plan & Migrating Services to Cloud	8
3.	Migrating Large scale services to the cloud & Cloud Data Center	8
4.	Data Center Networking & Data Center Storage-Area Networking	7
5.	Data Center Server Virtualization & Data Center Network Services	7

B. DETAILED SYLLABUS

Unit	Unit Details
1	Migrating into a Cloud
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction, Challenges while migrating to Cloud, • Broad approaches to migrating into the cloud why migrate -deciding on cloud migration, the Seven-step model of migration into a cloud, Migration Risks and Mitigation, • Enterprise cloud computing paradigm, relevant Deployment Models for Enterprise Cloud Computing, • Adoption and Consumption Strategies, issues for enterprise applications on the cloud • Conclusion of Unit
2	Cloud Migration Plan & Migrating Services to Cloud
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Migration Plan, Migration plan considerations , Time Management, Security, Vendor Selection, Selecting the deployment model, Validating the services to be moved to cloud, Effectiveness of cloud migration, • Migration and deployment options, Optimization and Cost Management in an effective cloud migration,

	<p>Business continuity after Migration, Case Study on Cloud Migration</p> <ul style="list-style-type: none"> • Migrating Services to AWS, Cloud Adoption Framework, Successful Migration • Understanding On-premises cost, Migration cost considerations, Migration options. • Conclusion of Unit
3	Migrating Large scale services to the cloud & Cloud Data Center
	<ul style="list-style-type: none"> • Introduction of Unit • Three Step processes for large scale services, Successful Migrations, Handling Failures, Risks involved in working at a big scale migration, • Pre-release and deployment considerations, Monitoring and Alerting, Mitigation • Introduction Cloud and data centers ,Data Center Networks, Software-Defined Networking (SDN) , Virtualization and Parallel Programming, • Traffic Engineering in Data Centers, Task Scheduling in Data Centers, Congestion Control in Data Centers • Conclusion of Unit
4	Data Center Networking & Data Center Storage-Area Networking
	<ul style="list-style-type: none"> • Introduction of Unit • Data Center Network Architecture, Cisco Nexus Product Family, Virtualizing Cisco Network Devices • Data Center Interconnect, Management and Monitoring of Cisco Nexus Devices • Data Center Storage Architecture, Cisco MDS Product Family, Virtualizing Storage • Fibre Channel Storage-Area Networking, Data Center Bridging and FCoE, Multihop Unified Fabric • Conclusion of Unit
5	Data Center Server Virtualization & Data Center Network Services
	<ul style="list-style-type: none"> • Introduction of Unit • Cisco Unified Computing System Architecture, Cisco Unified Computing System Manager • Cisco Unified Computing System Pools, Policies, Templates, and Service Profiles, Administration, Management, and Monitoring of Cisco Unified Computing System • Cisco Nexus 1000V and Virtual Switching, Cisco ACE and GSS, Cisco WAAS and Application Acceleration • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Migrating Large-Scale Services to the Cloud	Eric Passmore		Apress

2.	Cloud Native Data Center etworking	Dinesh G. Dutt		O'Reilly
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Reference Book

1.	Data Center for Beginners: A beginner's
2.	Data Center Handbook
3.	The Datacenter as a Computer

Online Resources

1.	https://datacenters.lbl.gov/dcep
2.	https://www.cisco.com/c/en/us/training-events/training-certifications/certifications/meraki-solutions.html
3.	https://www.cnet-training.com/

COURSE OUTCOME

Students will be able to:

- Explain the core concepts of the cloud Solution: how and why this paradigm shift came about, the characteristics, components and Rapid elasticity brought about by the various models and services in cloud computing.
- Analyze various clouds computing tools and applies them to solve problems on the cloud.
- Discuss system, Network Troubleshooting and Viruses and outline their role in enabling the cloud computing system.
- To know the Cisco Data center Troubleshooting.
- To able to handle the core concepts of the cloud Services (AWS) Troubleshooting.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Cloud Solution	06
2.	Cloud & Tools	06
3.	Network Troubleshooting	08
4.	Server and Data center Troubleshooting	08
5.	Cloud Services and Troubleshooting	08

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Cloud Solution <ul style="list-style-type: none"> • Introduction of Unit • Origins of Cloud computing • Cloud components - Essential characteristics , On-demand self-service, Broad network access, • Location independent resource pooling • Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, • Roots of cloud computing. • Architectural influences – High-performance computing, Utility and Enterprise grid computing • Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, • Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies. • Conclusion of Unit
2.	Cloud & Tools

	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Simulator (Cloud Sim and GridSim) • Understanding CloudSim simulator • CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim • Introduction to GreenCloud • Conclusion of Unit
3.	Network Troubleshooting
	<ul style="list-style-type: none"> • Introduction of Unit • Overview of H/W & S/Network, internet, file backups • Troubleshooting Methods • Structured Troubleshooting • Network Maintenance Tasks and Best Practices • Basic Switching and Routing Process • Effective IOS Troubleshooting Commands • Specialized Maintenance and Troubleshooting Tools • Security-Viruses, Worms, Spam, E-Mail Virus, Securing pc, Boot device. • Conclusion of Unit
4.	Server and Data center Troubleshooting
	<ul style="list-style-type: none"> • Introduction of Unit • Understanding the Troubleshooting Mechanism (Diagnosis) • Discussion on System Safe Boot Options , Understanding about the User Accounts & Passwords Policies • Troubleshooting Data Network Protocols • Troubleshooting Network Virtualization and Automation • Troubleshooting Application Centric Infrastructure • Conclusion of Unit
5.	Cloud Services and Troubleshooting
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to Amazon Web Services (AWS) • Understanding How AWS is Physically Set Up and EC2 • EC2 Troubleshooting Scenarios • VPC Troubleshooting Scenarios

- ELB Troubleshooting Scenarios
- Auto Scaling Troubleshooting Scenarios
- LAB- Troubleshooting Connectivity Issues
- Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cloud Computing For Dummies	Judith S. Hurwitz, Fern Halper, Robin Bloor, Marcia Kaufman	2009	<u>Originally</u>
2.	Data Center Handbook	Hardcover		
Reference Book				
1.	The Data Center Builder's Bible			
2.	Network Troubleshooting Tools			
3.	AWS The Ultimate Step-by-Step Guide From Beginners to Advance for Amazon Web Services			
Online Resources				
1.	https://www.manageengine.com/opmanager/troubleshoot			
2.	http://piazza.com/cmu/spring2016/1531915619/home .			
3.	https://learningnetwork.cisco.com/s/data-center-training-videos			

COURSE OUTCOME

Students will be able to:

- Comprehend the basics of cloud platforms and risk issues in cloud computing.
- Describe cloud security architecture, challenges and requirements.
- To know the functionality of the data security.
- Identifying best practices and strategies for a secure cloud environment.
- Illustrate how to perform Design Patterns in cloud platform.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Fundamentals of Cloud Computing and Architectural Characteristics	08
2.	Secure Isolation of Physical & Logical Infrastructure	09
3.	Data Protection for Cloud Infrastructure and Services	10
4.	Enforcing Access Control for Cloud Infrastructure based Services	07
5.	Cloud Computing Security Design Patterns	06

B. DETAILED SYLLABUS

Unit	Unit Details
1	Fundamentals of Cloud Computing and Architectural Characteristics
	<ul style="list-style-type: none"> • Introduction of Unit • Understand what is Cloud computing • Architectural and Technological Influences of Cloud Computing • Understand the Cloud deployment models • Public, Private, Community and Hybrid models • Scope of Control S • Software as a Service (SaaS) • Platform as a Service (PaaS) • Infrastructure as a Service (IaaS) • Cloud Computing Roles Risks and Security Concerns • Conclusion of Unit
2	Secure Isolation of Physical & Logical Infrastructure
	<ul style="list-style-type: none"> • Introduction of Unit • Compute, Network and Storage • Common attack vectors and threats • Secure Isolation Strategies • Multitenancy, Virtualization strategies • Inter-tenant network segmentation strategies • Storage isolation strategies

	<ul style="list-style-type: none"> • Conclusion of Unit
3	Data Protection for Cloud Infrastructure and Services
	<ul style="list-style-type: none"> • Introduction of Unit • Understand the Cloud based Information Life Cycle • Data protection for Confidentiality and Integrity • Common attack vectors and threats • Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key Management, Assuring data deletion • Data retention, deletion and archiving procedures for tenant data • Data Protection Strategies • Conclusion of Unit
4	Enforcing Access Control for Cloud Infrastructure based Services
	<ul style="list-style-type: none"> • Introduction of Unit • Understand the access control requirements for Cloud infrastructure • Common attack vectors and threats • Enforcing Access Control Strategies • Compute, Network and Storage • Authentication and Authorization • Roles-based Access Control, Multi-factor authentication • Host, storage and network access control options • OS Hardening and minimization, securing remote access, Verified and measured boot • Firewalls, IDS, IPS and honeypots • Conclusion of Unit
5	Cloud Computing Security Design Patterns
	<ul style="list-style-type: none"> • Introduction of Unit • Security Patterns for Cloud Computing • Trusted Platform • Geo-tagging • Cloud VM Platform Encryption • Trusted Cloud Resource Pools • Secure Cloud Interfaces • Cloud Resource Access Control • Cloud Data Breach Protection • Permanent Data Loss Protection • In-Transit Cloud Data Encryption • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Cloud Security and Privacy	Tim Mather, Subra Kumaraswamy, and Shahed Latif		O'Reilly
2	Cryptography for Security and Privacy in Cloud Computing	Daniel Slamanig		

Reference Book

1	Cryptography for Security and Privacy in Cloud Computing
2	Network Security and Cryptography

Online Resources

1	https://www.tutorialspoint.com/cloud_computing/cloud_computing_security.htm
2	https://orca.security/lp/cloud-security-risk-assessment/?gclid=Cj0KCQjwwJuVBhCAARIsAOPwGARz0i-81pb8VQXDg0Lae6_bMIEg525JRpI-9mVhx1F-3psvX5ISJbEaAl_PEALw_wcB

Practical

Code: BCTCCA5201

Cloud Deployment Lab

1 Credit [LTP: 0-0-2]

Course Outcome:-

Students will be able to:

- Apply EC2 & DNS System.
- Create Amazon S3 and other Services.
- Uses of Different Amazon Services.
- Handle Cloud database Migration.
- Use Amazon Machine Learning in real world environment.

A. LIST OF EXPERIMENTS:

1	Understand EC2 and DNS System
2	Introduction to Amazon Simple Storage Service (S3)
3	Introduction to Amazon Cloud Front
4	Introduction to AWS Key Management Service
5	Introduction to Amazon Elastic search Service
6	Introduction to Amazon Dynamo DB
7	Introduction to Amazon API Gateway
8	Introduction to Amazon Redshift
9	Introduction to Amazon Aurora
10	Introduction to Amazon Machine Learning
11	Introduction to AWS Database Migration Service
12	Introduction to AWS Lambda

B. RECOMMENDED STUDY MATERIAL

Text Books:	
1	Cloud Computing: Principles and Paradigms
2	Cloud Deployment Models A Complete Guide – 2019
Reference Book	
1	Cloud Computing Simplified
2	Practical Cloud Security
Online Resources	
1	https://cloud.google.com/deploy/docs/tutorials
2	https://www.javatpoint.com/cloud-deployment-model

Course Outcome:-

Students will be able:

- To know network Troubleshooting.
- The capability to think innovatively and creatively in solving cloud challenges.
- To able to the core concepts of the cloud Services Troubleshooting.
- To develop technical development skills

A. LIST OF EXPERIMENTS:

S.No	Experiment
1	Troubleshooting IP Problems
2	Troubleshooting Local Connectivity Issues
3	Correcting the Repetitive IP address Entry Issue
4	Troubleshooting Physical Connectivity Issues
5	Troubleshooting Routing Problems
6	Troubleshooting Upper-layer Faults
7	Troubleshooting Wireless Network Connection Issue
8	Troubleshooting AWS Fault Injection
9	View and Compare Amazon SageMaker.
10	How to check the AWS services not connected properly.
11	What are different types of Backups available?
12	What are the installation procedures of new cloud server?

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Cloud Computing For Dummies	Judith S. Hurwitz, Fern Halper, Robin Bloor, Marcia Kaufman	2009	<u>Originally</u>
2	Data Center Handbook	Hardcover		
3	Teaching Core Skills of Troubleshooting, in Network & System Problems			Lambert
Reference Book				
4	Network Troubleshooting Tools			
5	AWS The Ultimate Step-by-Step Guide From Beginners to Advance for Amazon Web Services			
Online Resources				
1	https://www.softwaretestinghelp.com/network-troubleshooting-steps-tools/			
2	https://docs.aws.amazon.com/fis/latest/userguide/security_iam_troubleshoot.html			
3	https://docs.aws.amazon.com/sagemaker/latest/dg/experiments-view-compare.html			

Course Outcome:-

Students will be able:

- To know the functionality of the data security.
- Identifying best practices and strategies for a secure cloud environment.
- To know the implementation of various techniques and security algorithms.
- Illustrate how to perform Design Patterns in cloud platform.
- Implement Network oriented technique using Cloud server

A. LIST OF EXPERIMENTS:

S. No	Experiment
1	Designing of sample cloud services.
2	To Implement and Break Shift Cipher
3	To Implement Mono–Alphabetic Cipher
4	To Implement One–Time Pad Cipher
5	To Implement Message Authentication Codes (MD5)
6	To Implement Cryptographic Hash Function (SHA-256)
7	To Implement Symmetric Encryption Cipher DES
8	To Implement Symmetric Encryption Cipher AES
9	To Implement Diffie–Hellman Key Establishment
10	To Implement Public–Key Cryptosystems (RSA)
11	To Implement Digital Signatures (DSA)
12	Develop a Hello World application using Google App Engine.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cloud Security and Privacy	Tim Mather, Subra Kumaraswamy, and Shahed Latif		O'Reilly
2.	Cryptography for Security and Privacy in Cloud Computing	Daniel Slamanig		
Reference Book				
1.	Cryptography for Security and Privacy in Cloud Computing			
2.	Network Security and Cryptography			
Online Resources				
1.	Google Cyber Security Tag			
2.	https://cloudlabs.ai/virtual-labs-for-cyber-security/			

DEPARTMENT ELECTIVE

Code: BCAECA5111

Advanced Cloud Technology

3Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Describe the types of medical robots and the concepts of navigation and motion replication.
- Discuss about the sensors used for localization and tracking
- Summarize the applications of surgical robotics
- Outline the concepts in Rehabilitation of limbs and brain machine interface
- Classify the types of assistive robots. Analyze the design characteristics, methodology and technological choices for medical robots

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction	07
2.	Communications and Networking in the Cloud Computing & Protocols	08
3.	Fundamentals Of Online Robots & IOT Architecture	08
4.	Mobile Robots and Cloud Computing with Web of Things	07
5.	Remote Mobility in the Cloud Computing & IOT Applications	07

B. DETAILED SYLLABUS

Unit	Unit Details
	Introduction
1.	<ul style="list-style-type: none"> • Introduction of Unit • Overview and background, Brief history of cloud computing and robotics. • Network Robotics, ROS, MatLab • Data Center and remote-device communication , Wireless network and Robot • Different Types of Antennas & Characteristics of Antenna • Privacy and Security Issues in the cloud network. • Conclusion of Unit
2.	Communications and Networking in the Cloud Computing & Protocols
	<ul style="list-style-type: none"> • Introduction of Unit • The Internet ,Wired Communication Links • Wireless Links – Properties of Networked Telerobotics • Building a Networked Telerobotic system • State command Presentation ,Command Execution/ State Generation , Collaborative Control • Protocol Standardization for IoT , Efforts – M2M and WSN Protocols • SCADA and RFID Protocols ,Issues with IoT Standardization , • Unified Data Standards – Protocols – IEEE802.15.4 • BACNet Protocol– Modbus – KNX – Zigbee • Network layer ,APS layer , Security • Conclusion of Unit
3.	Fundamentals Of Online Robots & IOT Architecture
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction – Robot Manipulators , Teleoperation – Teleoperation on a local network • Teleoperation via a constrained link. • IoT Open source architecture (OIC), OIC Architecture & Design principles

	<ul style="list-style-type: none"> IoT Devices and deployment models- IoTivity : An Open source IoT stack Overview-IoTivity stack architecture,Resource model and Abstraction. Conclusion of Unit
4.	Mobile Robots and Cloud Computing with Web of Things
	<ul style="list-style-type: none"> Introduction of Unit Introduction to networked robot system on the Web, Software Architecture and design – Interface design. Web of Things versus Internet of Things ,Two Pillars of the Web Architecture Standardization for WoT, Platform Middleware for WoT Unified Multitier WoT Architecture WoT Portals and Business Intelligence. Conclusion of Unit
5.	Remote Mobility in the Cloud Computing & IOT Applications
	<ul style="list-style-type: none"> Introduction of Unit Autonomous Mobile Robot on the Web , Mobile Mini Robots ,Performance of Mobile Robots controlled through WEB Handling Latency in Internet based Tele operation Case Study Computer Networked Robotics Online Robots and the Robot Museum. IoT applications for industry: Future Factory Concepts, Brownfield IoT Smart Objects, Smart Applications. Study of existing IoT platforms /middleware IoT- A, Hydra etc. Conclusion of Unit

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Handbook of Cloud Computing	BorkoFurht, Armando Escalante	2010	Springer Science &Business,
2.	Cloud Robotics – Distributed Robotics using Cloud Computing	Joao Pedro, Carvalho Rosa,	2016	Coimbra
Reference Book				
1.	Robots and Sensor Clouds			
2.	Networking Humans, Robots and Environments			
3.	Emergent Trends in Robotics and Intelligent Systems			
Online Resources				
1.	https://www.simplilearn.com/cloud-solutions-architect-masters-program-training?utm_source=google&utm_medium=cpc&utm_term=cloud%20course&utm_content=17438038281-138244819140-602766657095&utm_device=c&utm_campaign=Search-TechCluster-Cloud-AbsoluteBroadKeywords-IN-Main-AllDevice-adgroup-Cloud-Course-Broad&gclid=EAIAIQobChMIra3uw7Gs-AIVEBsrCh0BAGqsEAAYASAAEgLJlvD_BwE			
2.	https://www.ibm.com/in-en/cloud/internet-of-things?utm_content=SRCWW&p1=Search&p4=43700052658173554&p5=e&gclid=EAIAIQobChMInZHDz7Gs-AIVvp1LBR0V-gHmEAAYASAAEgLJpfD_BwE&gclsrc=aw.ds			

COURSE OUTCOME

Students will be able to:

- Explain the basic principles and operations of data structures.
- Analyze algorithms and to determine algorithm correctness and time efficiency class.
- Apply Hashing, Disjoint sets and String Matching techniques for solving problems effectively.
- Apply the concepts of advanced Trees and Graphs for solving problems effectively.
- Analyze the given scenario and choose appropriate Data Structure for solving problems.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Hashing	07
2.	Priority Queues (Heaps)	08
3.	Trees	07
4.	Graphs Algorithms	07
5.	Disjoint Sets and String Matching	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Hashing
	<ul style="list-style-type: none"> • Introduction to Hashing • Hash Function • Separate Chaining • Hash Tables without linked lists: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Hash Tables in the Standard Library • Universal Hashing • Extendible Hashing. • Conclusion of Unit
2.	Priority Queues (Heaps)
	<ul style="list-style-type: none"> • Introduction to Priority Queues (Heaps) • Model • Simple implementations • Binary Heap: Structure Property, Heap Order Property, • Basic Heap Operations: insert, delete, Percolate down • Other Heap Operations • Introduction to Binomial Queues • Binomial Queue Structure • Binomial Queue Operations • Implementation of Binomial Queue • Priority Queues in the Standard Library. • Conclusion of Unit
3.	Trees
	<ul style="list-style-type: none"> • Introduction to Trees • AVL: Single Rotation, Double Rotation • B-Trees • Multi-way Search Trees – 2-3 Trees

	<ul style="list-style-type: none"> • Searching for an Element in a 2-3 Tree • Inserting a New Element in a 2-3 Tree • Deleting an Element from a 2-3 Tree • Red-Black Trees • Properties of red-black trees: Rotations, Insertion, Deletion. • Conclusion of Unit
4.	Graphs Algorithms
	<ul style="list-style-type: none"> • Introduction to Graphs Algorithms • Elementary Graph Algorithms: Topological sort • Single Source Shortest Path Algorithms: Dijkstra's, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall's Algorithm • Conclusion of Unit
5.	Disjoint Sets and String Matching
	<ul style="list-style-type: none"> • Introduction to Disjoint Sets • Equivalence relation • Basic Data Structure • Simple Union and Find algorithms • Smart Union and Path compression algorithm. • Introduction to String Matching • The naive string-matching algorithm • The Rabin-Karp algorithm • The Knuth-Morris-Pratt algorithm. • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Structures and Algorithm Analysis in C++	Mark Allen Weiss	4 th Edition	Pearson
2.	Introduction to Algorithms	Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	3 rd Edition	The MIT Press.
Reference Book				
1.	Fundamentals of Computer Algorithms, 2nd Edition, 2009, University Press Pvt. Ltd, Ellis Horowitz, Satraj Sahani and Raja sekharam.			
2.	Advanced Data Structures, Oxford University Press, 2018, ReemaThareja, S. Rama Sree.			
Online Resources				
1.	https://www.coursera.org/learn/advanced-data-structures			
2.	https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/			
3.	https://nptel.ac.in/courses/106106133			
4.	https://www.mooc-list.com/search/node?keys=Advanced+Data+Structures			
5.	https://freevideolectures.com/course/2279/data-structures-and-algorithms			

COURSE OUTCOME

Students will be able to:

- Explain the types of the data to be mined and present a general classification of tasks.
- Apply preprocessing methods for any given raw data.
- Extract interesting patterns from large amounts of data.
- Choose and employ suitable data mining algorithms to build analytical applications
- Explain the organization of data in the form of data warehouse

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Data Mining	07
2.	Classification	07
3.	Cluster Analysis	08
4.	Association Rule Mining and Visualization	07
5.	Data warehousing	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Data Mining
	<ul style="list-style-type: none"> • Introduction to Data Mining • Data Mining Tasks • Components of Data Mining Algorithms • Data Mining supporting Techniques • Major Issues in Data Mining • Measurement and Data • Data Preprocessing • Data sets • Conclusion of Unit
2.	Classification
	<ul style="list-style-type: none"> • Introduction to Classification • Basic Concepts • Decision Tree induction • Bayes Classification Methods • Rule Based Classification • Model Evaluation and Selection • Techniques to Improve Classification Accuracy • Classification: Advanced concepts • Bayesian Belief Networks • Classification by Back Propagation • Support Vector Machine • Classification using frequent patterns. • Conclusion of Unit
3.	Cluster Analysis
	<ul style="list-style-type: none"> • Introduction to Cluster Analysis

	<ul style="list-style-type: none"> • Basic concepts and Methods • Partitioning methods • Hierarchical methods • Density Based Methods • Grid Based Methods • Evaluation of Clustering • Advanced Cluster Analysis: Probabilistic model based clustering, Clustering High Dimensional Data, Clustering Graph and Network Data, Clustering with Constraints. • Conclusion of Unit
4.	Association Rule Mining and Visualization
	<ul style="list-style-type: none"> • Introduction to Association Rule Mining • Large Item sets • Basic Algorithms • Parallel and Distributed Algorithms • Comparing Approaches • Incremental Rules • Advanced Association Rule Techniques • Measuring the Quality of Rules • Introduction to Visualization • Visualization of Multidimensional Data • Diagrams for Multidimensional visualization • Visual Data Mining • Data Mining Applications • Case Study: WEKA. • Conclusion of Unit
5.	Data warehousing
	<ul style="list-style-type: none"> • Introduction to Data warehousing • Data warehousing components • Multi dimensional data model • Data warehouse architecture • Data warehouse implementation • Mapping the data warehouse to multiprocessor architecture • OLAP • Need • Categorization of OLAP Tools • Introduction to Data Cube • Data Cube Technology: Efficient Methods for Data Cube Computation • Exploration and Discovery in Multidimensional Databases • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Mining Concepts and Techniques	Jiawei Han and Micheline Kamber	Third Edition	Elsevier
2.	Principles of Data Mining (Adaptive Computation and Machine Learning)	David J. Hand, Heikki Mannila and Padhraic Smyth	Latest	
3.	Data Mining: Introductory and Advanced Topics	Margaret H Dunham	Latest	
Reference Book				
1.	Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006, K.P. Soman, Shyam Diwakar and V. Ajay			
2.	Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition, Ian H.Witten and Eibe Frank.			
3.	Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, 35th Reprint 2016, Alex Berson and Stephen J.Smith.			
Online Resources				
1.	https://www.javatpoint.com/data-mining			
2.	https://nptel.ac.in/courses/106105174			
3.	https://onlinecourses.swayam2.ac.in/cec20_cs12/preview			

Course Outcomes:

On successful completion of the course the learners will be able to:

- Explain the importance of human values and learn from others' experiences to become the conscious practitioners of the same.
- Enhance their self-esteem, confidence and assertive behaviour to handle difficult situations with grace, style, and professionalism
- Distinguish among various levels of professional ethics while developing an apprehension of them as a process in an organization
- Implement emotional intelligence to achieve set targets and excel in interpersonal as well as intrapersonal
- Demonstrate knowledge of personal beliefs and values and a commitment to continuing personal reflection and reassessment

UNIT NO.	UNIT NAME	Hours
1	Introduction to Human Values	6
2	Study of Self	4
3	Introduction to Professional Ethics	4
4	Emotional Intelligence	6
5	Life Skills & Value Education	5

LIST OF LABS	
1.	Human Values: Love & Compassion
2.	Truth, Non-Violence, Righteousness
3.	Peace, Service, Renunciation (Sacrifice)
4.	Self-Esteem: Do's and Don'ts to develop positive self-esteem
5.	Self-Assertiveness: Development of Assertive Personality
6.	Ambition & Desire: Self & Body (concepts & differences)
7.	Professional Ethics: Personal & Professional Ethics
8.	Emotional Intelligence: Skill Building for Strengthening the Elements of Self-awareness, Self-regulation, Internal motivation, Empathy, Social skills
9.	Governing Ethics & Ethics Dilemma
10.	Profession, Professionalism & Professional Risks
11.	Professional Accountabilities & Professional Success
12.	Life Skills & Value Education

Course Outcomes:

On successful completion of the course the learners will be able to

- Integrate their apprehensions into their leadership skills development process
- Demonstrate knowledge of the working environment impacting business organizations and exhibit an apprehensions of ethical implications of decisions
- Assess leadership styles and sharpen the managerial skills to communicate effectively and facilitate decision making in relation with self-management, stress management and conflict management
- Generate a creative thinking, something beyond the obvious answers and solution to a specific problem.
- Explain the significance of trust and team skills, creating new innovative ideas with the help of brainstorming and learn work etiquettes.

UNIT NO.	UNIT NAME	Hours
1	Leadership Skills	4
2	Entrepreneurial Skills	4
3	Managerial Skills: Self –Management, Stress Management & Conflict Management	6
4	Creative Thinking & Design Thinking	6
5	Team Building & Confidence Building	5

LIST OF LABS

1.	Leadership Skills: Stages of development
2.	Leadership Skills I: Attributes of great leaders, decision making, activities to enhance such qualities
3.	Leadership Through Biographies
4.	Entrepreneurial Skills: Traits & Competencies of an Entrepreneur
5.	Managerial Skills: Conflict Management
6.	Self-Management: Challenges & Solutions
7.	Stress Management : Causes of stress and regulation
8.	Creating Business Plans: Problem Identification and Idea Generation
9.	Design Thinking: Transforming Challenges into Opportunities
10.	Creative Thinking & Analytical Thinking: Presentation
11.	Team building: Developing teams and team work
12.	Confidence Building : Improving engagement, communicating effectively & activities to facilitate decision making

COURSE OUTCOME:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -V, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Fourth Semester are as follows:

:

Code	Activity	Hours	Credits
BCACCA3601	Talent Enrichment Programme(TEP)-V	4	1
	Library / MOOC / Online Certificate Courses		
	Non Syllabus Project (NSP) / Industry Visit / CRT		

SEMESTER VI

Code:BCACCA6501

Project/Internship

11 Credit [LTP: 0-0-22]

Part A	
	<p>The students will undertake a project as part of their final semester of BCA. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.</p> <p>If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.</p> <p>Bridge Course: The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through two week mandatory classroom participation where faculty and other experts will give adequate inputs in application based subjects, IT and soft skills.</p> <p>The Project: Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project.</p>
	<p>Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.</p> <p>Project Evaluation Guidelines: The Project evaluator(s) verify and validate the information presented in the project report. The break-up of marks would be as follows:</p> <ol style="list-style-type: none">1. Internal Evaluation2. External Assessment3. Viva Voce <p>Internal Evaluation: Internal Evaluation of project need to evaluate Internal Project work based on the following criteria:</p> <ul style="list-style-type: none">• Project Scope, Objectives and Deliverables• Research Work, Understanding of concepts• Output of Results and Proper Documentation• Interim Reports and Presentations– Twice during the course of the project <p>The Components of the Interim Reports are given below:</p> <p>First Interim Report:</p> <ul style="list-style-type: none">• A study on the existing software/app/product in the market• The proposed software/app/product with the additional features• The technical requirements• The proposed work flow scheme - including the work allocation for each of the team members• A Presentation

Second Interim Report:

- The refined design and scheme/data-flow
- The Course Progress – The percentage completion
- Plan for the project completion
- A Presentation

External Evaluation:

- The Project evaluator(s) perform the External Assessment based on the following criteria.
- Understanding of the Project Concept
- Delivery Skill
- The Final Project Report
- Originality and Novelty

Part B**The Final Project Report Details:**

The report should have a excel sheet that documents the work of every project member

- The project report should be documented in the following format:

1. Acknowledgements
2. Project Synopsis
3. Introduction
4. Existing system and proposed system
5. Project Background
 - a. Overview
 - b. Objectives
 - c. Development Requirements
 - d. Other Resources
 - e. Issues that needed to be considered
 - f. Preparation done
6. Requirements Analysis
7. Design Architecture (Based on your respective Specialization)
8. (Project Oriented Topics)
9. (Project Oriented Topics)
10. Future enhancement
11. Screen shots
12. Summary
13. Appendices
14. References

Part C**Viva Voce**

Handling questions

- Clarity and Communication Skill

Marking Scheme:

1. **Internal Evaluation:** 35% of Total Marks
2. **External Evaluation:** 50% of Total Marks
3. **Viva Voce:** 15 % of Total Marks

For e.g., If the total mark for the project is 100, then

- Internal Evaluation = 35 marks

The break-up of marks is shown below:-

- Interim Evaluation 1: 10 marks
- Interim Evaluation 2: 10 marks
- Understanding of concepts: 5 marks
- Programming technique: 5 marks
- Execution of code : 5 marks

- External Evaluation = 50 marks

The break-up of marks is shown below:-

- Project Report: 15 marks
- Explanation of project working: 10 marks
- Execution of code: 10 marks – (if done in industry, a standalone module can be reprogrammed and submitted. Error rectification etc can be included by the evaluator)
- Participation in coding: 15 marks
- Viva Voce = 15 marks

The break-up of marks is shown below: -

- Questions related to project: 10 marks
- Questions related to technology: 5 marks
- The Project evaluator(s) verifies and validates the information presented in the project report.

OVERVIEW AND OBJECTIVES:

- The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student’s personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.
- Discipline and Talent Enrichment Programme (TEP)-VI shall be evaluated on the basis of its sub constituent programmes, as a complete Two credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance

*****HAPPY LEARNING*****