**KONGU ENGINEERING COLLEGE** 

(Autonomous Institution Affiliated to Anna University, Chennai)

# PERUNDURAI ERODE - 638 060

# TAMILNADU INDIA



# **REGULATIONS, CURRICULUM & SYLLABI – 2022**

(CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION)

(For the students admitted during 2022 - 2023 and onwards)

# BACHELOR OF SCIENCE DEGREE IN INFORMATION SYSTEMS

**DEPARTMENT OF COMPUTER TECHNOLOGY** 





## INDEX

SI. No.	CONTENTS	Page No.
1	VISION AND MISSION OF THE INSTITUTE	3
2	QUALITY POLICY	3
3	VISION AND MISSION OF THE DEPARTMENT	3
4	PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	3
5	PROGRAM OUTCOMES (POs)	4
6	PROGRAM SPECIFIC OUTCOMES (PSOs)	5
7	REGULATIONS 2022	6
8	CURRICULUM BREAKDOWN STRUCTURE	23
9	CATEGORISATION OF COURSES	23
10	SCHEDULING OF COURSES	32
11	MAPPING OF COURSES WITH PROGRAM OUTCOMES	33
12	CURRICULUM OF B.Sc – INFORMATION SYSTEMS	37
13	DETAILED SYLLABUS	41



## KONGU ENGINEERING COLLEGE PERUNDURAI ERODE – 638 060

#### (Autonomous)

## **INSTITUTE VISION**

To be a centre of excellence for development and dissemination of knowledge in Applied Sciences, Technology, Engineering and Management for the Nation and beyond.

#### **INSTITUTE MISSION**

We are committed to value based Education, Research and Consultancy in Engineering and Management and to bring out technically competent, ethically strong and quality professionals to keep our Nation ahead in the competitive knowledge intensive world.

## **QUALITY POLICY**

We are committed to

- Provide value based quality education for the development of students as competent and responsible citizens.
- Contribute to the nation and beyond through research and development
- Continuously improve our services

## DEPARTMENT OF COMPUTER TECHNOLOGY

## VISION

To become a technically competent centre in the domain of computer science to take care of the global industrial needs.

## MISSION

Department of Computer Technology-UG is committed to:

- MS1: Develop inventive, proficient, ethical and quality conscious Software professionals
- MS2: Produce stake holders who can contribute to technological development and social upliftment
- MS3: Provide students with the state-of-art technologies to excel in academics to meet the IT industrial needs

## **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

Graduate of Information Systems will:

- PEO1: Practice in Computer and Information Systems related field and/or pursue advanced studies.
- PEO2: Function as a responsible professional and to adapt to an ever-changing environment.
- PEO3: Incorporate ethical values and continuous learning to resolve societal issues.

<b>MS\PEO</b>	PEO1	PEO2	PEO3
MS1	3	3	2
MS2	3	3	2
MS3	2	2	2

## MAPPING OF MISSION STATEMENTS (MS) WITH PEOS

1 – Slight, 2 – Moderate, 3 – Substantial

	PROGRAM OUTCOMES (POs)					
Gradua	tes of Information Systems will:					
PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.					
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.					
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.					
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.					
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.					
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.					
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.					
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.					
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.					
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.					
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.					
PO12	<b>Life-long learning:</b> 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.					



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## PROGRAM SPECIFIC OUTCOMES (PSOs)

Gradua	Graduates of Information Systems will:				
PSO1	Provide solutions for the problems of Computer and Information systems domain, using				
	Programming, Web scripting and Information security skills.				
PSO2	Apply software professional skills to enhance IT oriented services.				

PEO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEO1	2	3	3	1	1	1	2	3	3	2	2	1	3	2
PEO2	1	2	3	1	1	2	1	1	2	2	1	2	2	3
PEO3	1	1	1	1	1	1	1	3	2	2	1	3	3	2

## MAPPING OF PEOs WITH POs AND PSOs

1 – Slight, 2 – Moderate, 3 – Substantial

## KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE – 638060

## (An Autonomous Institution Affiliated to Anna University)

## **REGULATIONS 2022**

## CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION

## **BACHELOR OF SCIENCE (BSc) DEGREE PROGRAMMES**

These regulations are applicable to all candidates admitted into BSc Degree programmes from the academic year 2022 – 2023 onwards.

## 1. DEFINITIONS AND NOMENCLATURE

In these Regulations, unless otherwise specified:

- i. "University" means ANNA UNIVERSITY, Chennai.
- ii. "College" means KONGU ENGINEERING COLLEGE.
- iii. "Programme" means Bachelor of Science (BSc) Degree programme
- iv. "Branch" means specialization or discipline of BSc Degree Programme, like Computer Systems and Design, Information Systems and Software Systems.
- v. "Course" means a Theory / Theory cum Practical / Practical course that is normally studied in a semester like Mathematics, C Programming, etc.
- vi. "Credit" means a numerical value allocated to each course to describe the candidate's workload required per week.
- vii. "Grade" means the letter grade assigned to each course based on the marks range specified.
- viii. "Grade point" means a numerical value (0 to 10) allocated based on the grade assigned to each course.
- ix. "Principal" means Chairman, Academic Council of the College.
- x. "Controller of Examinations" means authorized person who is responsible for all examination related activities of the College.
- xi. "Head of the Department" means Head of the Department concerned of the College.



## 2. PROGRAMMES AND BRANCHES OF STUDY

The BSc programmes and branches of study approved by Anna University, Chennai are offered by the College.

Programme	Branch
	Computer Systems and Design
BSc	Information Systems
	Software Systems

#### 3. ADMISSION REQUIREMENTS

Candidates for admission to the first semester of the BSc Programme shall be required to have passed the Higher Secondary Examination (academic / vocational) of the (10+2) curriculum prescribed by the appropriate authority of Govt. of Tamil Nadu or any examination of any other authority accepted by the Anna University, Chennai as equivalent thereto

## 4. STRUCTURE OF PROGRAMMES

#### 4.1 Categorisation of Courses

The BSc programme shall have a curriculum with syllabi comprising of theory, theory cum practical, practical courses in each semester, professional skills training, project work, internship, etc. that have been approved by the Board of Studies and Academic Council of the College. All the programmes have well defined Programme Outcomes (PO), Programme Specific Outcomes (PSO) and Programme Educational Objectives (PEOs) as per Outcome Based Education (OBE). The content of each course is designed based on the Course Outcomes (CO). The courses shall be categorized as follows:

- i. Humanities and Social Sciences (HS) including Management Courses
- ii. Basic Science (BS) Courses
- iii. Engineering Science (ES) Courses
- iv. Professional Core (PC) Courses
- v. Professional Elective (PE) Courses
- vi. Open Elective (OE) Courses
- vii. Employability Enhancement Courses (EC) like Project work, Professional Skills/Industrial Training, Entrepreneurships/Start ups and Internship in Industry or elsewhere
- viii. Audit Courses (AC)
- ix. Mandatory Courses (MC) like Student Induction Program

## 4.2 Credit Assignment

## 4.2.1. Credit Assignment

Each course is assigned certain number of credits as follows:

Contact period per week	Credits
1 Lecture / Tutorial Period	1
2 Practical Periods	1
2 Project Work Periods	1
40 Training / Internship Periods	1

The minimum number of credits to complete the BSc programme is 130.

## 4.3 Employability Enhancement Courses

A candidate shall be offered with the employability enhancement courses like project work, internship, professional skills training/ industrial training, internship and entrepreneurships/start ups during the programme to gain/exhibit the knowledge/skills.

## 4.3.1 Professional Skills Training/Industrial Training/ Entrepreneurships/Start Ups

A candidate may be offered with appropriate training courses imparting programming skills, communication skills, problem solving skills, aptitude skills, etc. It is offered in two phases as phase I in third semester and phase II in fourth semester including vacation periods and each phase can carry two credits.

## (OR)

A candidate may be allowed to go for training at research organizations or industries for a required number of hours in third semester vacation period. Such candidate can earn two credits for this training course in place of Professional Skills Training course II in fourth semester. He/She shall attend Professional Skills Training Phase I in third semester and can earn two credits.

## (OR)

A candidate may be allowed to set up a start up and working part-time for the start ups by applying his/her innovations and can become a student entrepreneur during BSc programme. Candidates can set up their start up from third semester onwards either inside or outside of the college. Such student entrepreneurs may earn a maximum of 2 credits per semester for two semesters each in place of either Professional Skills Training I or Professional Skills Training II. The area in which the candidate wants to initiate a start up may be interdisciplinary or multidisciplinary. The progress of the startup shall be evaluated by a panel of members constituted by the Principal through periodic reviews.

## 4.3.2 Full Time Project through Internships

The curriculum enables a candidate to go for full time project through internship during a part of fifth semester and/or entire final semester and can earn credits through it for his/her academics vide clause 7.6, 7.7 and clause 7.11.



A candidate is permitted to go for full time projects through internship in fifth semester with the following condition: The candidate shall complete a part of the fifth semester courses with a total credit of about 50% of the total credits of fifth semester including Project Work I in the first two months from the commencement of the fifth semester under fast track mode. The balance credits required to complete the fifth semester shall be earned by the candidate through either approved Value Added Courses /Online courses / Self Study Courses or Add/Drop courses as per clause 4.4 and clause 4.5 respectively.

A candidate is permitted to go for full time internship during sixth semester in place of Project Work II. Such candidate shall earn the minimum number of credits required to complete sixth semester other than project/internship through either approved Onealue Added Courses /Online courses / Self Study Courses or Add/Drop courses as per clause 4.4 and clause 4.5 respectively. The number of credits for the internship same as that of Project Work in the final semester.

Assessment procedure is to be followed as specified in the guidelines approved by the Academic Council.

## 4.4 One / Two Credit Courses / Online Courses / Self Study Courses

The candidate may optionally undergo One / Two Credit Courses / Online Courses / Self Study Courses as elective courses.

- **4.4.1 One / Two Credit Courses:** One / Two credit courses shall be offered by the college with the prior approval from respective Board of Studies. A candidate can earn a maximum of six credits through one / two credit courses during the entire duration of the programme.
- **4.4.2 Online Courses:** Candidates may be permitted to earn credits for online courses, offered by NPTEL / SWAYAM / a University / Other Agencies, approved by the Board of Studies.
- **4.4.3** Self Study Courses: The Department may offer an elective course as a self study course. The syllabus of the course shall be approved by the Board of Studies. However, mode of assessment for a self study course will be the same as that used for other courses. The candidates shall study such courses on their own under the guidance of member of the faculty. Self study course is limited to one per semester.
- **4.4.4** The elective courses in the final year may be exempted if a candidate earns the required credits vide clause 4.4.1, 4.4.2 and 4.4.3 by registering the required number of courses in advance (up to fifth semester).
- **4.4.5** A candidate can earn a maximum of 24 credits through all value added courses, online courses and self study courses.

## 4.5 Flexibility to Add or Drop Courses

- **4.5.1** A candidate has to earn the total number of credits specified in the curriculum of the respective programme of study in order to be eligible to obtain the degree. However, if the candidate wishes, then the candidate is permitted to earn more than the total number of credits prescribed in the curriculum of the candidate's programme.
- **4.5.2** From the first to sixth semesters the candidates have the option of registering for additional elective courses or dropping of already registered additional elective courses within two weeks from the start of the semester. Add / Drop is only an option given to the candidates. Total number of credits of such courses during the entire programme of study cannot exceed eight.
- **4.6** Maximum number of credits the candidate can enroll in a particular semester cannot exceed 30 credits.
- **4.7** The blend of different courses shall be so designed that the candidate at the end of the programme would have been trained not only in his / her relevant professional field but also would have developed to become a socially conscious human being.
- **4.8** The medium of instruction, examinations and project report shall be English.

## 5. DURATION OF THE PROGRAMME

- **5.1** A candidate is normally expected to complete the BSc Degree programme in 6 consecutive semesters/3 Years, but in any case not more than 10 semesters/5 Years.
- **5.2** Each semester shall consist of a minimum of 90 working days including continuous assessment test period. The Head of the Department shall ensure that every teacher imparts instruction as per the number of periods specified in the syllabus for the course being taught.
- **5.3** The total duration for completion of the programme reckoned from the commencement of the first semester to which the candidate was admitted shall not exceed the maximum duration specified in clause 5.1 irrespective of the period of break of study (vide clause 11) or prevention (vide clause 9) in order that the candidate may be eligible for the award of the degree (vide clause 16). Extension beyond the prescribed period shall not be permitted.

## 6. COURSE REGISTRATION FOR THE EXAMINATION

- **6.1** Registration for the end semester examination is mandatory for courses in the current semester as well as for the arrear courses failing which the candidate will not be permitted to move on to the higher semester. This will not be applicable for the courses which do not have an end semester examination.
- **6.2** The candidates who need to reappear for the courses which have only continuous assessment shall enroll for the same in the subsequent semester, when offered next, and repeat the course. In this case, the candidate shall attend the classes, satisfy the attendance requirements (vide clause 8), earn continuous assessment marks. This will be considered as an attempt for the purpose of classification.



**6.3** If a candidate is prevented from writing end semester examination of a course due to lack of attendance, the candidate has to attend the classes, when offered next, and fulfill the attendance requirements as per clause 8 and earn continuous assessment marks. If the course, in which the candidate has a lack of attendance, is an elective, the candidate may register for the same or any other elective course in the subsequent semesters and that will be considered as an attempt for the purpose of classification.

## 7. ASSESSMENT AND EXAMINATION PROCEDURE FOR AWARDING MARKS

7.1 The BSc programmes consist of Theory Courses, Theory cum Practical courses, Practical courses, Project Work, Industrial / Professional Training, Internship and Entrepreneurships/ Start ups. Performance in each course of study shall be evaluated based on (i) Continuous Assessments (CA) throughout the semester and (ii) End Semester Examination (ESE) at the end of the semester except for the courses which are evaluated based on continuous assessment only. Each course shall be evaluated for a maximum of 100 marks as shown below:

Sl. No.	Category of Course	Continuous Assessment Marks	End Semester Examination Marks	
1.	Theory	40	60	
2.	Theory cum Practical (The distribution of marks shall be decided based on the credit weightage assigned to theory and practical components.)	50	50	
3.	Practical	60	40	
4.	Professional Skills Training / Industrial Training / Entrepreneurships / Start ups / Internships/Mandatory Course	100		
5.	Project Work I / Project Work II Phase II / Internships	50	50	
6.	One / Two credit Course	The distribution of		
7.	All other Courses	marks shall be decided based on the credit weightage assigned		

**7.2** Examiners for setting end semester examination question papers for theory courses, theory cum practical courses and practical courses and evaluating end semester examination answer scripts, project works, internships and entrepreneurships/start ups shall be appointed by the Controller of Examinations after obtaining approval from the Principal.

## 7.3 Theory Courses

For all theory courses out of 100 marks, the continuous assessment shall be 40 marks and the end semester examination shall be for 60 marks. However, the end semester examinations shall be conducted for 100 marks and the marks obtained shall be reduced to 60. The continuous assessment tests shall be conducted as per the schedule laid down in the academic schedule. The total of the continuous assessment marks and the end semester examination marks shall be rounded off to the nearest integer.

**7.3.1** The assessment pattern for awarding continuous assessment marks shall be as follows:

Sl. No.	Туре	Max. Marks	Remarks		
	Test - I	20			
1.	Test - II	20	Average of best two		
	Test - III	20			
			Should be of Open Book/Objective Type.		
2.	Tutorial	15	Average of best 4 (or more, depending on the nature of the course, as may be approved by Principal)		
3.	Assignment / Paper Presentation in Conference / Seminar / Comprehension / Activity based learning / Class notes	05	To be assessed by the Course Teacher based on any one type.		
	Total	40	Rounded off to the one decimal place		

However, the assessment pattern for awarding the continuous assessment marks may be changed based on the nature of the course and is to be approved by the Principal.

- **7.3.2** A reassessment test or tutorial covering the respective test or tutorial portions may be conducted for those candidates who were absent with valid reasons (Hospitalised / Sports or any other reason approved by the Principal).
- **7.3.3** The end semester examination for theory courses shall be for duration of three hours and shall be conducted between November and January during odd semesters and between April and June during even semesters of every year.

## 7.4 Theory cum Practical Courses

For courses involving theory and practical components, the evaluation pattern as per the clause 7.1 shall be followed. Depending on the nature of the course, the end semester examination shall be conducted for theory and the practical components. The apportionment of continuous assessment and end semester examination marks shall be decided based on the credit weightage assigned to theory and practical components.

## 7.5 Practical Courses

For all practical courses out of 100 marks, the continuous assessment shall be for 60 marks and the end semester examination shall be for 40 marks. Every exercise / experiment shall be evaluated based on the candidate's performance during the practical class and the candidate's records shall be maintained.

- **7.5.1** The assessment pattern for awarding continuous assessment marks for each course shall be decided by the course coordinator based on rubrics of that particular course, and shall be based on rubrics for each experiment.
- **7.5.2** The end semester examination shall be conducted for a maximum of 100 marks for duration of 3 hours and reduced to 40 marks. The appointment of examiners and the schedule shall be decided by chairman of Board of Study of the relevant board.

## 7.6 Project Work II

- **7.6.1** Project work shall be assigned to a single candidate or to a group of candidates not exceeding 4 candidates in a group. The project work is mandatory for all the candidates.
- **7.6.2** The Head of the Department shall constitute review committee for project work. There shall be two assessments by the review committee during the semester. The candidate shall make presentation on the progress made by him/her before the committee.
- **7.6.3** The continuous assessment and end semester examination marks for Project Work and the Viva-Voce Examination shall be distributed as below.

Continuous Assessment (Max. 50 Marks)						End Sem (Ma	nester Ex ax. 50 M	aminati arks)	on
Zeroth	n Review	Review I (Max 20 I	Marks)	Review II (Max. 30 Marks)	)	Report Evaluation (Max. 20 Marks)	Viva - V (Max. 30]	√oce Marks)	
Rv.	Guide	Review	Guide	Review	Guide	Ext. Exr.	Guide	Exr.1	Exr.2
Com		Committee		Committee					
	(excluding		(excluding						
		guide)		guide)					
0	0	10	10	15	15	20	10	10	10

- **7.6.4** The Project Report prepared according to approved guidelines and duly signed by the Supervisor shall be submitted to Head of the Department. The candidate(s) must submit the project report within the specified date as per the academic schedule of the semester. If the project report is not submitted within the specified date then the candidate is deemed to have failed in the Project Work and redo it in the subsequent semester.
- 7.6.5 If a candidate fails to secure 50% of the continuous assessment marks in the project work, he / she shall not be permitted to submit the report for that B.Sc Information Systems, Regulation, Curriculum and Syllabus R2022

particular semester and shall have to redo it in the subsequent semester and satisfy attendance requirements.

- **7.6.6** The project work shall be evaluated based on the project report submitted by the candidate in the respective semester and viva-voce examination by a committee consisting of two examiners and guide of the project work.
- **7.6.7** If a candidate fails to secure 50 % of the end semester examination marks in the project work, he / she shall be required to resubmit the project report within 30 days from the date of declaration of the results and a fresh viva-voce examination shall be conducted as per clause 7.6.6.
- **7.6.8** A copy of the approved project report after the successful completion of viva-voce examination shall be kept in the department library.

## 7.7 Project Work I

The Project Work I shall be evaluated based on continuous assessment and end semester examinations. The evaluation method shall be same as that of the Project Work II as per clause 7.6.

## 7.8 Industrial Training

After completion of Industrial training, the candidate shall submit a brief report on the training undergone and a certificate obtained from the organization concerned. The evaluation will be made based on this report and a Viva-Voce Examination. A copy of the certificate (issued by the Organization) submitted by the candidate shall be attached to the mark list and sent to Controller of Examinations by the respective Head of the Department.

Continuous Assessment (Max. 100 Marks)				
Report Evaluation (Max. 40 Marks)	Viva - Voce (Max. 60 Marks)			
Review Committee	Guide Review Committee			
40	20	40		

## 7.9 Professional Skills Training

Phase I training shall be conducted for minimum 80 hours in 2<sup>nd</sup> semester vacation and during 3<sup>rd</sup> semester. Phase II training shall be conducted for minimum 80 hours in 3<sup>rd</sup> semester vacation and during 4<sup>th</sup> semester. The evaluation procedure shall be approved by the board of the offering department and Principal.



## 7.10 Entrepreneurships/ Start ups

A start up/business model may be started by a candidate individually or by a group of maximum of three candidates during the programme vide clause 4.3.1. The head of the department concerned shall assign a faculty member as a mentor for each start up.

A review committee shall be formed by the Principal for reviewing the progress of the start ups / business models, innovativeness, etc. The review committee can recommend the appropriate grades for academic performance for the candidate(s) involved in the start ups. This course shall carry a maximum of two credits in third semester and two credits in fourth semester respectively and shall be evaluated through continuous assessments for a maximum of 100 marks vide clause 7.1. A report about the start ups to be submitted to the review committee for evaluation for each start up and the marks will be given to Controller of Examinations after getting approval from Principal.

## 7.11 In-Plant Training

Each candidate shall submit a brief report about the internship undergone and a certificate issued from the organization concerned.

## 7.12 One / Twe Credit Courses

For all one/ two credit courses out of 100 marks, the continuous assessment shall be 50 marks and the model examination shall be for 50 marks. Minimum of two continuous assessments tests shall be conducted during the one / two credit course duration by the offering department concerned. Model examination shall be conducted at the end of the course.

## 7.13 Online Course

The Board of Studies will provide methodology for the evaluation of the online courses. The Board can decide whether to evaluate the online courses through continuous assessment and end semester examination or through end semester examination only. In case of credits earned through online mode from NPTEL / SWAYAM / a University / Other Agencies approved by Chairman, Academic Council, the credits may be transferred and grades shall be assigned accordingly.

## 7.14 Self Study Course

The member of faculty approved by the Head of the Department shall be responsible for periodic monitoring and evaluation of the course. The course shall be evaluated through continuous assessment and end semester examination. The evaluation methodology shall be the same as that of a theory course.

## 7.15 Audit Course

A candidate may be permitted to register for specific course not listed in his/her programme curriculum and without undergoing the rigors of getting a 'good' grade, as an Audit course, subject to the following conditions.

The candidates can register only one Audit course in a semester starting from second semester subject to a maximum of two courses during the entire programme of study. Such courses shall be indicated as 'Audit' during the time of Registration itself. Only courses currently offered for credit to other branches candidates can be audited.

A course appearing in the curriculum of a candidate cannot be considered as an audit course. However, if a candidate has already met the Professional Elective and Open Elective credit requirements as stipulated in the curriculum, then, a Professional Elective or an Open Elective course listed in the curriculum and not taken by the candidate for

credit can be considered as an audit course.

Candidates registering for an audit course shall meet all the assessment and examination requirements (vide clause 7.3) applicable for a credit candidate of that course. Only if the candidate obtains a performance grade, the course will be listed in the semester Grade Sheet and in the Consolidated Grade Sheet along with the grade SC (Successfully Completed). Performance grade will not be shown for the audit course.

Since an audit course has no grade points assigned, it will not be counted for the purpose of GPA and CGPA calculations.

## 7.16 Mandatory Course

A candidate shall attend and complete a three week mandatory course namely Student Induction Program including Universal Human Values and Yoga, etc at the beginning of the first semester. No credits shall be given for such courses and shall be evaluated through continuous assessment tests only vide clause 7.1 for a maximum of 100 marks each. Upon the successful completion, these courses will be listed in the semester grade sheet and in the consolidated grade sheet with the grade "SC" (Successfully Completed). Since no grade points are assigned, these courses will not be counted for the purpose of GPA and CGPA calculations.

## 8. REQUIREMENTS FOR COMPLETION OF A SEMESTER

- **8.1** A candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester and permitted to appear for the examinations of that semester.
  - **8.1.1** Ideally, every candidate is expected to attend all classes and secure 100 % attendance. However, a candidate shall secure not less than 80 % (after rounding off to the nearest integer) of the overall attendance taking into account the total number of working days in a semester.
  - **8.1.2** A candidate who could not satisfy the attendance requirements as per clause 8.1.1 due to medical reasons (hospitalization / accident / specific illness) but has secured not less than 70 % in the current semester may be permitted to appear for the current semester examinations with the approval of the Principal on payment of a condonation fee as may be fixed by the authorities from time to time. The medical certificate needs to be submitted along with the leave application. A candidate can avail this provision only once during the entire duration of the degree programme.

A candidate who could not satisfy the attendance requirements as per clause 8.1.1 due to his/her entrepreneurships/ start ups activities, but has secured not less than 60 % in the current semester can be permitted to appear for the current semester examinations with the approval of the recommendation of review committee and Principal.

- **8.1.3** In addition to clause 8.1.1 or 8.1.2, a candidate shall secure not less than 60 % attendance in each course.
- **8.1.4** A candidate shall be deemed to have completed the requirements of study of any semester only if he/she has satisfied the attendance requirements (vide clause 8.1.1 to 8.1.3) and has registered for examination by paying the prescribed fee.
- **8.1.5** Candidate's progress is satisfactory.

- **8.1.6** Candidate's conduct is satisfactory and he/she was not involved in any indisciplined activities in the current semester.
- **8.2.** The candidates who do not complete the semester as per clauses from 8.1.1 to 8.1.6 except 8.1.3 shall not be permitted to appear for the examinations at the end of the semester and not be permitted to go to the next semester. They have to repeat the incomplete semester in next academic year.
- **8.3** The candidates who satisfy the clause 8.1.1 or 8.1.2 but do not complete the course as per clause 8.1.3 shall not be permitted to appear for the end semester examination of that course alone. They have to repeat the incomplete course in the subsequent semester when it is offered next.

## 9. REQUIREMENTS FOR APPEARING FOR END SEMESTER EXAMINATION

- **9.1** A candidate shall normally be permitted to appear for end semester examination of the current semester if he/she has satisfied the semester completion requirements as per clause 8, and has registered for examination in all courses of that semester. Registration is mandatory for current semester examinations as well as for arrear examinations failing which the candidate shall not be permitted to move on to the higher semester.
- **9.2** When a candidate is deputed for a National / International Sports event during End Semester examination period, supplementary examination shall be conducted for such a candidate on return after participating in the event within a reasonable period of time. Such appearance shall be considered as first appearance.
- **9.3** A candidate who has already appeared for a course in a semester and passed the examination is not entitled to reappear in the same course for improvement of letter grades / marks.

## 10. PROVISION FOR WITHDRAWAL FROM EXAMINATIONS

- **10.1** A candidate may, for valid reasons, be granted permission to withdraw from appearing for the examination in any regular course or all regular courses registered in a particular semester. Application for withdrawal is permitted only once during the entire duration of the degree programme.
- **10.2** The withdrawal application shall be valid only if the candidate is otherwise eligible to write the examination (vide clause 9) and has applied to the Principal for permission prior to the last examination of that semester after duly recommended by the Head of the Department.
- **10.3** The withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class with Distinction/First Class.
- **10.4** If a candidate withdraws a course or courses from writing end semester examinations, he/she shall register the same in the subsequent semester and write the end semester examinations. A final semester candidate who has withdrawn shall be permitted to appear for supplementary examination to be conducted within reasonable time as per clause 14.



**10.5** The final semester candidate who has withdrawn from appearing for project viva-voce for genuine reasons shall be permitted to appear for supplementary viva-voce examination within reasonable time with proper application to Controller of Examinations and on payment of prescribed fee.

## 11. PROVISION FOR BREAK OF STUDY

- **11.1** A candidate is normally permitted to avail the authorised break of study under valid reasons (such as accident or hospitalization due to prolonged ill health or any other valid reasons) and to rejoin the programme in a later semester. He/She shall apply in advance to the Principal, through the Head of the Department, stating the reasons therefore, in any case, not later than the last date for registering for that semester examination. A candidate is permitted to avail the authorised break of study only once during the entire period of study for a maximum period of one year. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for the break of study.
- **11.2** The candidates permitted to rejoin the programme after break of study / prevention due to lack of attendance shall be governed by the rules and regulations in force at the time of rejoining.
- **11.3** The candidates rejoining in new Regulations shall apply to the Principal in the prescribed format through Head of the Department at the beginning of the readmitted semester itself for prescribing additional/equivalent courses, if any, from any semester of the regulations in-force, so as to bridge the curriculum in-force and the old curriculum.
- **11.4** The total period of completion of the programme reckoned from the commencement of the semester to which the candidate was admitted shall not exceed the maximum period specified in clause 5 irrespective of the period of break of study in order to qualify for the award of the degree.
- **11.5** If any candidate is prevented for want of required attendance, the period of prevention shall not be considered as authorized break of study.
- **11.6** If a candidate has not reported to the college for a period of two consecutive semesters without any intimation, the name of the candidate shall be deleted permanently from the college enrollment. Such candidates are not entitled to seek readmission under any circumstances.

## 12. PASSING REQUIREMENTS

- **12.1** A candidate who secures not less than 50 % of total marks (continuous assessment and end semester examination put together) prescribed for the course with a minimum of 45 % of the marks prescribed for the end semester examination in all category of courses vide clause 7.1 except for the courses which are evaluated based on continuous assessment only shall be declared to have successfully passed the course in the examination.
- **12.2** A candidate who secures not less than 50 % in continuous assessment marks prescribed for the courses which are evaluated based on continuous assessment only shall be declared to have successfully passed the course. If a candidate secures less than 50% in



the continuous assessment marks, he / she shall have to re-enroll for the same in the subsequent semester and satisfy the attendance requirements.

**12.3** For a candidate who does not satisfy the clause 12.1, the continuous assessment marks secured by the candidate in the first attempt shall be retained and considered valid for subsequent attempts. However, from the fourth attempt onwards the marks scored in the end semester examinations alone shall be considered, in which case the candidate shall secure minimum 50 % marks in the end semester examinations to satisfy the passing requirements, but the grade awarded shall be only the lowest passing grade irrespective of the marks secured.

## **13. REVALUATION OF ANSWER SCRIPTS**

A candidate shall apply for a photocopy of his / her semester examination answer script within a reasonable time from the declaration of results, on payment of a prescribed fee by submitting the proper application to the Controller of Examinations. The answer script shall be pursued and justified jointly by a faculty member who has handled the course and the course coordinator and recommended for revaluation. Based on the recommendation, the candidate can register for revaluation through proper application to the Controller of Examinations. The Controller of Examinations will arrange for revaluation and the results will be intimated to the candidate concerned. Revaluation is permitted only for Theory courses and Theory cum Practical courses where end semester examination is involved.

## 14. SUPPLEMENTARY EXAMINATION

If a candidate fails to clear all courses in the final semester after the announcement of final end semester examination results, he/she shall be allowed to take up supplementary examinations to be conducted within a reasonable time for the courses of final semester alone, so that he/she gets a chance to complete the programme.

## **15. AWARD OF LETTER GRADES**

For all the passed candidates, the relative grading principle is applied to assign the letter grades.

Marks / Examination Status	Letter Grade	Grade Point
	O (Outstanding)	10
	A+ (Excellent)	9
Based on the relative	A (Very Good)	8
grading	B+ (Good)	7
	B (Average)	6
	C (Satisfactory)	5
Less than 50	U (Reappearance)	0
Successfully Completed	SC	0
Withdrawal	W	-

Absent	AB	-
Shortage of Attendance in a course	SA	-

The Grade Point Average (GPA) is calculated using the formula:

$$GPA = \frac{\sum [(course credits) \times (grade points)] \text{ for all courses in the specific semester}}{\sum (course credits) \text{ for all courses in the specific semester}}$$

The Cumulative Grade Point Average (CGPA) is calculated from first semester to final semester using the formula

$$CGPA = \frac{\sum [(course credits) \times (grade points)] \text{ for all courses in all the semesters so far}}{\sum (course credits) \text{ for all courses in all the semesters so far}}$$

The GPA and CGPA are computed only for the candidates with a pass in all the courses.

The GPA and CGPA indicate the academic performance of a candidate at the end of a semester and at the end of successive semesters respectively.

A grade sheet for each semester shall be issued containing Grade obtained in each course, GPA and CGPA.

A duplicate copy, if required can be obtained on payment of a prescribed fee and satisfying other procedure requirements.

Withholding of Grades: The grades of a candidate may be withheld if he/she has not cleared his/her dues or if there is a disciplinary case pending against him/her or for any other reason.

## 16. ELIGIBILITY FOR THE AWARD OF DEGREE

A candidate shall be declared to be eligible for the award of the BSc Degree provided the candidate has

- i. Successfully completed all the courses under the different categories, as specified in the regulations.
- ii. Successfully gained the required number of total credits as specified in the curriculum corresponding to the candidate's programme within the stipulated time (vide clause 5).
- iii. Successfully passed any additional courses prescribed by the Board of Studies whenever readmitted under regulations other than R-2020 (vide clause 11.3)
- iv. No disciplinary action pending against him / her.

## 17. CLASSIFICATION OF THE DEGREE AWARDED

## **17.1** First Class with Distinction:

- **17.1.1** A candidate who qualifies for the award of the degree (vide clause 16) and who satisfies the following conditions shall be declared to have passed the examination in First class with Distinction:
  - Should have passed the examination in all the courses of all the six semesters in the **First Appearance** within six consecutive semesters excluding the authorized break of study (vide clause 11) after the commencement of his / her study.
  - Withdrawal from examination (vide clause 10) shall not be considered as an appearance.
  - Should have secured a CGPA of not less than 8.50

(OR)

- **17.1.2** A candidate who joins from other institutions on transfer or a candidate who gets readmitted and has to move from one regulations to another regulations and who qualifies for the award of the degree (vide clause 16) and satisfies the following conditions shall be declared to have passed the examination in First class with Distinction:
  - Should have passed the examination in all the courses of all the six semesters in the **First Appearance** within six consecutive semesters excluding the authorized break of study (vide clause 11) after the commencement of his / her study.
  - Submission of equivalent course list approved by the Board of studies.
  - Withdrawal from examination (vide clause 10) shall not be considered as an appearance.
  - Should have secured a CGPA of not less than 9.00

## 17.2 First Class:

A candidate who qualifies for the award of the degree (vide clause 16) and who satisfies the following conditions shall be declared to have passed the examination in First class:

- Should have passed the examination in all the courses of all six semesters within eight consecutive semesters excluding authorized break of study (vide clause 11) after the commencement of his / her study
- Withdrawal from the examination (vide clause 10) shall not be considered as an appearance.
- Should have secured a CGPA of not less than 6.50

## 17.3 Second Class:

All other candidates (not covered in clauses 17.1 and 17.2) who qualify for the award of the degree (vide clause 16) shall be declared to have passed the examination in Second Class.

**17.4** A candidate who is absent for end semester examination in a course / project work after having registered for the same shall be considered to have appeared for that examination



for the purpose of classification.

## 18. MALPRACTICES IN TESTS AND EXAMINATIONS

If a candidate indulges in malpractice in any of the tests or end semester examinations, he/she shall be liable for punitive action as per the examination rules prescribed by the college from time to time.

## **19. AMENDMENTS**

Notwithstanding anything contained in this manual, the Kongu Engineering College through the Academic council of the Kongu Engineering College, reserves the right to modify/amend without notice, the Regulations, Curricula, Syllabi, Scheme of Examinations, procedures, requirements, and rules pertaining to its BSc programme.

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		C	URRIC	JLUM B	REAKD	OWN S	TRUCTURE								
	Summary of Credit Distribution														
			Sem	ester			Total	Curriculum Content							
Category	Ι	II	ш	IV	v	VI	(% of total number of credits of the program)								
HS	4	4					8	6.2							
BS	4	4					8	6.2							
ES	5		4				9	6.9							
PC	10	15	19	23	10		77	59.2							
PE					6	6	12	9.2							
EC			2	2	6	6	16	12.3							
Semesterwise Total	23	23	25	25	22	12	130	100.0							

	CATEGORISATION OF COURSES														
STU	HUMANITIES AND SOCIAL SCIENCES AND MANAGEMENT STUDIES(HSMS), BASIC SCIENCES (BS),ENGINEERING SCIENCES(ES)														
S. No.	Course Code	Course Name	L	Т	Ρ	С	Sem								
1.	22BCC11	Communicative English I	3	0	2	4	I								
2.	22BCC21	Communicative English II	3	0	2	4	П								
3.	22BCC12	Mathematics I	3	1*	2*	4	Ι								
4.	22BCC22	Mathematics II	3	1*	2*	4	II								
5.	22BCT11	Digital Principles and Logic Design	3	0	0	3	Ι								
6.	22BCL11	Digital Principles and Logic Design Laboratory	0	0	4	2	I								
	Т	otal Credits to be earned				21									

S. No.	Course Code	Course Name	L	т	Ρ	С	Sem
1.	22BCT12	Problem Solving and Programming in C	3	0	0	3	I
2.	22BCT13	Web Programming	3	0	0	3	I
3.	22BCL12	C Programming Laboratory	0	0	4	2	I
4.	22BCL13	Web Programming Laboratory	0	0	4	2	I
5.	22BCT21	Advanced C Programming	3	0	0	3	II
6.	22BCT22	Java Programming	3	0	0	3	II
7.	22BCT23	Operating Systems	3	0	0	3	II
8.	22BCL21	Advanced C Programming Laboratory	0	0	4	2	II
9.	22BCL22	Java Programming Laboratory	0	0	4	2	II
10.	22BCL23	Operating Systems Laboratory	0	0	4	2	II
11.	22BCT31	Python Programming	3	0	0	3	III
12.	22BCT32	Data Structures and Algorithms	3	0	0	3	III
13.	22BCT33	Database Management Systems	3	0	0	3	
14.	22BCT34	Computer Organization	3	1	0	4	
15.	22BCT35	Software Engineering	3	1	0	4	
16.	22BCL31	Python Programming Laboratory	0	0	4	2	
17.	22BCL32	Data Structures Laboratory	0	0	4	2	
18.	22BCL33	Database Management Systems Laboratory	0	0	4	2	
19.	22BCT41	User Interface Technologies	3	0	0	3	IV
20.	22BIT41	Cryptography and Network Security	3	0	0	3	IV
21.	22BCT43	Mobile Application Development	3	0	0	3	IV
22.	22BCT44	Computer Networks	3	1	0	4	IV
23.	22BCC41	Big Data Analytics	3	0	2	4	IV
24.	22BCL41	User Interface Technologies Laboratory	0	0	4	2	IV
25.	22BIL41	Network Security Laboratory	0	0	4	2	IV
26.	22BCL43	Mobile Application Development Laboratory	0	0	4	2	IV
27.	22BCT51	Internet of Things	3	0	0	3	V
28.	22BCT52	Artificial Intelligence and Machine Learning	3	0	0	3	V
29.	22BCL51	Internet of Things Laboratory	0	0	4	2	V
30.	22BCL52	Machine Learning Laboratory	0	0	4	2	V
		Total Credits to be earned				81	

	PROFESSIONAL ELECTIVES (PEs)													
S. No.	Course Code	Course Name	L	Т	Р	С								
		Semester - V												
		Elective – I												
1.	22BCE01	Cloud Computing	3	0	0	3								
2.	22BIE01	Cyber Forensics and Security Management	3	0	0	3								
3.	22BIE02	Mobile communication	3	0	0	3								
		Elective – II												
4.	22BCE04	Object Oriented Analysis and Design	3	0	0	3								
5.	22BIE03	Social Web Mining	3	0	0	3								
6.	22BIE04	Internet Technologies	3	0	0	3								
		Semester - VI												
		Elective - III												
7.	22BCE07	Data Science	3	0	0	3								
8.	22BIE05	Information Technology Ethics	3	0	0	3								
9.	22BCE09	Software Project Management	3	0	0	3								
		Elective – IV												
10.	22BCE10	E-Commerce	3	0	0	3								
11.	22BIE06	Deep Learning	3	0	0	3								
12.	22BCE12	Augmented and Virtual Reality	3	0	0	3								

	EMPLOYABILITY ENHANCEMENT COURSES (EC)													
S.No.	Course Code	Course Name	L	т	Ρ	С	Sem							
1.	22GCL31	Professional Skills Training I	2	0	2	2	III							
2.	22GCL42	Professional Skills Training II	2	0	2	2	IV							
3.	22BIP51	Project Work I	0	0	12	6	V							
4.	22BIP61	Project Work II	0	0	12	6	VI							
	Tota	al Credits to be earned				16								



# SCHEDULING OF COURSES - B.Sc. INFORMATION SYSTEMS (Total Credit : 130)

Sem.	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	Course 9	Credit
1	22BCC11 Communicative English I (3-0-2-4)	22BCC12 Mathematics I (3-1*-2*-4)	22BCT11 Digital Principles and Logic Design (3-0-0-3)	22BCT12 Problem Solving and Programming in C (3-0-0-3)	22BCT13 Web Programming (3-0-0-3)	22MNT11 Student Induction Program (0-0-0-0)	22BCL11 Digital Principles and Logic Design Laboratory (0-0-4-2)	22BCL12 C Programming Laboratory (0-0-4-2)	22BCL13 Web Programming Laboratory (0-0-4-2)	23
II	22BCC21 Communicative English II (3-0-2-4)	22BCC22 Mathematics II (3-1*-2*-4)	22BCT21 Advanced C Programming (3-0-0-3)	22BCT22 Java Programming (3-0-0-3)	22BCT23 Operating Systems (3-0-0-3)	-	22BCL21 Advanced C Programming Laboratory (0-0-4-2)	22BCL22 Java Programming Laboratory (0-0-4-2)	22BCL23 Operating Systems Laboratory (0-0-4-2)	23
m	22BCT31 Python Programming (3-0-0-3)	22BCT32 Data Structures and Algorithms (3-0-0-3)	22BCT33 Database Management Systems (3-0-0-3)	22BCT34 Computer Organization (3-1-0-4)	22BCT35 Software Engineering (3-1-0-4)	22GCL31 Professional Skills Training I (2-0-2-2)	22BCL31 Python Programming Laboratory (0-0-4-2)	22BCL32 Data Structures Laboratory (0-0-4-2)	22BCL33 Database Management Systems Laboratory (0-0-4-2)	25
IV	22BCT41 User Interface Technologies (3-0-0-3)	22BIT41 Cryptography and Network security (3-0-0-3)	22BCT43 Mobile Application Development (3-0-0-3)	22BCT44 Computer Networks (3-1-0-4)	22BCC41 Big Data Analytics (3-0-2-4)	22GCL42 Professional Skills Training II (2-0-2-2)	22BCL41 User Interface Technologies Laboratory (0-0-4-2)	22BIL41 Network Security Laboratory (0-0-4-2)	22BCL43 Mobile Application Development Laboratory (0-0-4-2)	25
v	22BCT51 Internet of Things (3-0-0-3)	22BCT52 Artificial Intelligence and Machine Learning (3-0-0-3)	Elective I (3-0-0-3)	Elective II (3-0-0-3)	22BCL51 Internet of Things Laboratory (0-0-4-2)	22BCL52 Machine Learning Laboratory (0-0-4-2)	22BIP51 Project Work I (0-0-12-6)			22
VI	Elective III (3-0-0-3)	Elective IV (3-0-0-3)	22BIP61 Project Work II (0-0-12-6)			-				12

## MAPPING OF COURSES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	22BCC11	Communicative English I				✓		✓		✓	✓	✓		✓	✓	✓
1	22BCC12	Mathematics I				✓	✓							✓	✓	✓
1	22BCT11	Digital Principles and Logic Design				✓		✓							✓	✓
1	22BCT12	Problem Solving and Programming in C	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓
1	22BCT13	Web Programming	✓	✓	✓	✓	✓	✓			✓				✓	✓
1	22MNT11	Student Induction Program						✓		✓				✓	✓	✓
1	22BCL11	Digital Principles and Logic Design Laboratory				✓									✓	✓
1	22BCL12	C Programming Laboratory	~	✓	✓	✓									✓	✓
1	22BCL13	Web Programming Laboratory	~	✓	✓	✓									✓	✓
2	22BCC21	Communicative English II				√		✓		✓	✓	✓		✓	✓	✓
2	22BCC22	Mathematics II	~	✓	✓	✓	✓								✓	✓
2	22BCT21	Advanced C Programming	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓
2	22BCT22	Java Programming	~	$\checkmark$	✓	√	✓	✓	✓		✓	✓	✓	✓	✓	✓
2	22BCT23	Operating Systems	~	✓	✓	✓									✓	✓
2	22BCL21	Advanced C Programming Laboratory	✓	✓	✓	✓									✓	~
2	22BCL22	Java Programming Laboratory	~	✓	✓	✓									✓	✓
2	22BCL23	Operating Systems Laboratory	~	✓	✓	✓									✓	✓
3	22BCT31	Python Programming	✓	✓	✓	✓									✓	✓
3	22BCT32	Data Structures and Algorithms	✓	✓	√	✓	✓								✓	$\checkmark$
3	22BCT33	Database Management Systems	✓	✓	✓	✓									✓	✓
3	22BCT34	Computer Organization	✓	✓	✓	✓									✓	✓
3	22BCT35	Software Engineering	✓	✓	✓	✓									✓	✓
3	22GCL31	Professional Skills Training I	✓	✓				✓	✓		✓		✓	✓	✓	✓
3	22BCL31	Python Programming Laboratory	✓	✓	$\checkmark$	$\checkmark$									~	$\checkmark$
3	22BCL32	Data Structures Laboratory	✓	✓	✓	✓									~	✓
3	22BCL33	Database Management Systems Laboratory	~	✓	✓	✓									✓	✓
4	22BCT41	User Interface Technologies	✓	✓	✓	✓									✓	✓
4	22BIT41	Cryptography and Network security	~	✓	✓	✓	✓	✓			✓				✓	✓
4	22BCT43	Mobile Application Development	~	$\checkmark$	✓	✓									✓	$\checkmark$

B.Sc – Information Systems, Regulation, Curriculum and Syllabus – R2022

Sem	Course Code	Course Title	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
4	22BCT44	Computer Networks	~	✓	✓	~									✓	✓
4	22BCC41	Big Data Analytics	~	✓	✓	✓	~								✓	✓
4	22GCL42	Professional Skills Training II	✓	✓				✓	~		✓		✓	✓	~	~
4	22BCL41	User Interface Technologies Laboratory	✓	✓	✓	~									✓	✓
4	22BIL41	Network Security Laboratory	✓	✓	✓	~	✓								✓	✓
4	22BCL43	Mobile Application Development Laboratory	✓	✓	✓	~									✓	✓
5	22BCT51	Internet of Things	✓	✓	✓	~						$\checkmark$	✓	✓	✓	✓
5	22BCT52	Artificial Intelligence and Machine Learning	✓	✓	✓	✓									✓	✓
5	22BCL51	Internet of Things Laboratory	✓	✓	✓	✓	✓								✓	✓
5	22BCL52	Machine Learning Laboratory	✓	✓	✓	✓									✓	✓
5	22BIP51	Project Work I	✓	✓	✓	~									✓	✓
6	22BIP61	Project Work II	✓	✓	✓	✓									✓	✓
		Professional Electives														
5	22BCE01	Cloud Computing	~	✓	✓	~									~	~
5	22BIE01	Cyber Forensics and Security Management	~	✓	~	~									~	~
5	22BIE02	Mobile communication	~	✓	~	~									✓	~
5	22BCE04	Object Oriented Analysis and Design	✓	✓	~	~									✓	~
5	22BIE03	Social Web Mining	~	✓	~	~									~	~
5	22BIE04	Internet Technologies	~	✓	~	~									~	~
6	22BCE07	Data Science	✓	✓	✓	~									~	~
6	22BIE05	Information Technology Ethics	~	✓	~	~									~	~
6	22BCE09	Software Project Management	~	✓	✓	~	✓	✓			~				~	~
6	22BCE10	E-Commerce	~	✓	✓	~	✓	✓			~				~	~
6	22BIE06	Deep Learning	✓	✓	✓	~									~	~
6	22BCE12	Augmented and Virtual Reality	✓	✓	✓						~	✓	~		~	~



#### B.Sc – INFORMATION SYSTEMS - CURRICULUM – R2022 (for the students admitted from 2022-23 onwards)

	SEMESTEI	R – I							
Course	Course Title	Но	urs / V	Veek	Credit	Мах	Cate		
Code		L	Т	Р		СА	ESE	Total	gory
Theory/Theo	ry with Practical								
22BCC11	Communicative English I	3	0	2	4	50	50	100	HS
22BCC12	Mathematics I	3	1*	2*	4	50	50	100	BS
22BCT11	Digital Principles and Logic Design	3	0	0	3	40	60	100	BS
22BCT12	Problem Solving and Programming in C	3	0	0	3	40	60	100	PC
22BCT13	Web Programming	3	0	0	3	40	60	100	PC
22MNT11	Student Induction Program	-	•	-	-	100	-	100	MC
Practical / En	nployability Enhancement								
22BCL11	Digital Principles and Logic Design Laboratory	0	0	4	2	60	40	100	BS
22BCL12	C Programming Laboratory	0	0	4	2	100	0	100	PC
22BCL13	Web Programming Laboratory	0	0	4	2	60	40	100	PC
	Total Credits to be earned				23				

	SEMESTER – II											
Course	<b>0 - - - - - - - - - -</b>	Но	urs / \	Neek	•	Мах	imum	Marks	Cate			
Code	Course Title	L T P				CA	ESE	Total	gory			
Theory/Theo	ry with Practical											
22BCC21	Communicative English II	3	0	2	4	50	50	100	HS			
22BCC22	Mathematics II	3	1*	2*	4	50	50	100	BS			
22BCT21	Advanced C Programming	3	0	0	3	40	60	100	PC			
22BCT22	Java Programming	3	0	0	3	40	60	100	PC			
22BCT23	Operating Systems	3	0	0	3	40	60	100	PC			
Practical / En	nployability Enhancement											
22BCL21	Advanced C Programming Laboratory	0	0	4	2	100	0	100	PC			
22BCL22	Java Programming Laboratory	0	0	4	2	100	0	100	PC			
22BCL23	Operating Systems Laboratory	0	0	4	2	60	40	100	PC			
	Total Credits to be earned		23									



#### B.Sc – INFORMATION SYSTEMS - CURRICULUM – R2022 (for the students admitted from 2022-23 onwards)

	SEMESTER	2 – III							
Course		Но	urs / \	Veek		Мах	Cate		
Code	Course Title	L	Т	Р	Credit	СА	ESE	Total	gory
Theory/Theo	ory with Practical								
22BCT31	Python Programming	3	0	0	3	40	60	100	PC
22BCT32	Data Structures and Algorithms	3	0	0	3	40	60	100	PC
22BCT33	Database Management Systems	3	0	0	3	40	60	100	PC
22BCT34	Computer Organization	3	1	0	4	40	60	100	PC
22BCT35	Software Engineering	3	1	0	4	40	60	100	PC
Practical / E	mployability Enhancement								
22BCL31	Python Programming Laboratory	0	0	4	2	100	0	100	PC
22BCL32	Data Structures Laboratory	0	0	4	2	60	40	100	PC
22BCL33	Database Management Systems Laboratory	0	0	4	2	60	40	100	PC
22GCL31	Professional Skills Training I	2	0	2	2	100	-	100	EC
	Total Credits to be earned				25				

	SEMESTER – IV													
Course		Но	ours /	Week	Crodit	Мах	Cate							
Code	Course Title	L	Т	Р	Credit	СА	ESE	Total	gory					
Theory/Theo	bry with Practical													
22BCT41	User Interface Technologies	3	0	0	3	40	60	100	PC					
22BIT41	Cryptography and Network security	3	0	0	3	40	60	100	PC					
22BCT43	Mobile Application Development	3	0	0	3	40	60	100	PC					
22BCT44	Computer Networks	3	1	0	4	40	60	100	PC					
22BCC41	Big Data Analytics	3	0	2	4	50	50	100	PC					
Practical / E	mployability Enhancement													
22BCL41	User Interface Technologies Laboratory	0	0	4	2	60	40	100	PC					
22BIL41	Network Security Laboratory	0	0	4	2	60	40	100	PC					
22BCL43	Mobile Application Development Laboratory	0	0	4	2	60	40	100	PC					
22GCL42	Professional Skills Training II	2	0	2	2	100	-	100	EC					
	Total Credits to be earned				25		•							



#### B.Sc – INFORMATION SYSTEMS - CURRICULUM – R2022 (for the students admitted from 2022-23 onwards)

	SEMESTER – V													
Course		Но	ours /	Week		Ма	Cate							
Code	Course Title	L	Т	Р	Credit	СА	ESE	Total	gory					
Theory/Theo	ry with Practical													
22BCT51	Internet of Things	3	0	0	3	40	60	100	PC					
22BCT52	Artificial Intelligence and Machine Learning	3	0	0	3	40	60	100	PC					
	Elective I	3	0	0	3	40	60	100	PE					
	Elective II	3	0	0	3	40	60	100	PE					
Practical / E	nployability Enhancement													
22BCL51	Internet of Things Laboratory	0	0	4	2	60	40	100	PC					
22BCL52	Machine Learning Laboratory	0	0	4	2	60	40	100	PC					
22BIP51	Project Work I	0	12	6	50	50	100	EC						
	Total Credits to be earned		22											

	SEMESTER – VI													
Course		Но	ours / V	Week		Ма	Cate							
Code	Course Title	L	Т	Р	Credit	СА	ESE	Total	gory					
	Theory/Theory with Practical													
	Elective III	3	0	0	3	40	60	100	PE					
	Elective IV	3	0	0	3	40	60	100	PE					
	Practical / Employability Enhancement													
22BIP61	Project Work II	0	0	12	6	50	50	100	EC					
	Total Credits to be earned	•	12											

**Total Credits :130** 

LIST OF PROFESSIONAL ELECTIVES (PEs)														
S. No.	Course Code	Course Name	L	т	Р	С								
	Semester - V													
	Elective – I													
1.	22BCE01	Cloud Computing	3	0	0	3								
2.	22BIE01	3	0	0	3									
3.	22BIE02	Mobile communication	3	0	0	3								
	Elective – II													
7.	22BCE04	Object Oriented Analysis and Design	3	0	0	3								
8.	22BIE03	3	0	0	3									
9.	22BIE04	Internet Technologies	3	0	0	3								
		Semester - VI												
		Elective - III												
10.	22BCE07	Data Science	3	0	0	3								
11.	22BIE05	Information Technology Ethics	3	0	0	3								
12.	22BCE09	Software Project Management	3	0	0	3								
		Elective – IV												
13.	22BCE10	E-Commerce	3	0	0	3								
14.	22BIE06	Deep Learning	3	0	0	3								
15.	22BCE12	Augmented and Virtual Reality	3	0	0	3								

	22BCC11 - COMMUNICATIVE ENG	GLISH - I					
	(Common to Computer Systems and Design, Information	Systems	& Software S	yste	ms)	T	
Programme& Branch	B.Sc& Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	1	HS	3	0	2	4
Preamble	To employ techniques of active reading, effective speaking can gain confidence to communicate in formal forum effect	and integ	rate ideas th write long pas	roug	h wri es in	ting ski depend	ills. Learners dently.
Unit – I	Grammar and Vocabulary:						9
Parts of speed Activities: Liste	<ul> <li>Finite and non-finite verbs -Tenses- Reading: Prediction a ning: Types of listening - Speaking: Talking about oneself, one's</li> </ul>	nd Survey family, frie	ving - Writing ands and favo	g: E prite	ssay perso	rs- Dia ons.	logue writing -
Unit – II	Grammar and Vocabulary:						9
Cause and effe word and Spe Speaking: Non	ct expressions - Prefixes and Suffixes - Synonyms and Antonyr d - Writing: Describing persons, places and products and pro technical Presentation.	ns - Read cesses -	Activities: Lis	steni	ming ng: F	, Scan Process	ning, Word-by- s of listening -
Active and Pa	sive voice - Impersonal Passive - Reported Speech – Rea	dina: Rea	ding Compre	ehen	sion	– Sur	mmarizing and
Paraphrasing -	Writing: Warnings and Instructions - Activities: Listening: Effective	e listening	g strategies -	Spe	aking	: short	talks.
Unit – IV	Grammar and Vocabulary:						9
Abbreviations a Informal and F an event/story	nd Acronyms – Structure of captions / slogans - Prepositions - R rmal Letters: Enquiry and placing order - Activities: Listening: G	eading: Ir ap filling a	ntensive read activity while	ing a lister	and N ning	lote-ma - Spea	aking - Writing: king: Narrating
Unit – V	Grammar and Vocabulary:						9
Connectives a Rearranging ju lecture and tak	nd Discourse Markers and Text organization - Sentence Pat nbled sentences - Writing: E-mail Writing - Preparing the transc ng notes – Speaking: Describing an image/picture.	terns – P ript for a s	unctuations speech - Acti	- Re vities	eadin s: Lis	g: Ton tening:	gue twisters - Listening to a
LIST OF EXPE	RIMENTS / EXERCISES:						
1. Self-Ir	roduction						
2. News	Reading						
3. Makin	a non-technical Presentation						
4. Situati	nal dialogues						
5. Speak	ng about a dream job/company						
6. Readi	g newspaper articles/magazines						
7. Listen	ng comprehension						
8. Prepa	ng review of a book/movie						
9. Writing	about a recent scientific invention/technology						
10. Creati	e Writing: writing apoem/short story/ personal happenings – unfe	orgettable	moment in o	ne's	life		
TEXT BOOK:			Lect	ure:	45, P	ractica	al:30, Total:75
1. Sanjay	Kumar and PushpLata, "Communication Skills", 2nd Edition, Ne	w Delhi: C	xford Univer	sity F	Press	s, 2015	
REFERENCES	/ MANUAL / SOFTWARE:						
1. Raymo Camb	nd Murphy, "Essential English Grammar: Reference and Practic dge University Press, 2012.	e for South	n Asian Stude	ents"	', 2nc	l Editio	n, Cambridge:
2. Glenni	Pye, "Vocabulary in Practice, Parts 1 and 2", 1stEdition, Cambri	dge: Cam	bridge Unive	rsity	Pres	s, 201′	1.
3. DVD,	odcasts, Authentic Videos, and Laboratory Manual				_		

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	identify and use content words which carry more meaning	Understanding (K2)
CO2	construct sentences in English	Applying (K3)
CO3	read short, simple messages and texts with complete understanding	Understanding (K2)
CO4	write at the sentence and paragraph level and beyond	Applying (K3)
CO5	speak in a given context	Applying (K3)
CO6	acquire proficiency through effective listening and reading	Understanding (K2), Imitation (S1)
C07	write coherently without grammatical errors	Creating (K6)
CO8	take part in various professional and academic events	Analyzing (K4), Manipulation (S2)

	Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				1		2		1	2	3		3	1	1
CO2				1		2		1	2	3		3	1	1
CO3				1		2		1	3	3		3	1	1
CO4				1		2		1	3	3		3	1	1
CO5				1		2		1	3	3		3	1	1
CO6				1		2		1	2	3		3	1	1
CO7				1		2		1	2	3		3	1	1
CO8	CO8         1         2         1         2         3         3         1         1													
1 – Slight, 2	2 – Mode	erate, 3 -	- Substar	ntial, BT-	- Bloom'	s Taxon	omy							

		ASSESSME	NIPAIIER	N - THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	10	10	40	-	-	40	100
CAT2	10	10	40	-	-	40	100
CAT3	10	10	50	-	-	30	100
ESE	10	10	50	-	-	30	100
* ±3% may be varied	(CAT 1.2.3 – 50 ma	rks & ESE – 100 m	arks)				

(Common to Computer Systems and Design, Information Branch       Solution Systems & Software Systems         Programme& Branch       BS:ck Computer Systems       Design, Information       Sem.       Category       L       T       P       Credit         Programme& Branch       Nil       1       BS       3       1*       2*       4         Preamble       The course aims to formulate and solve problems using matrices. differential equations and fitting the best curve to the given data. Eventually the course provides a thorough understanding of solving real world problems using numerical methods.       9+3         Characteristic Equation of a matrix - Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors of real matrix - Information and fitting the best fittement and problems only. Representation of functions - Limit of a function - Continuity - Derivatives - Differential on utele (sum, poduci, quotient, chain rules) - Applications: Maxima and Minima of functions of one variable. Ordinary Differential fittement & simple problems only. Representation of functions - Limit of a function - Continuity - Derivatives - Differential on utele setulation of constants by the method of group averages: Fitting a straight line - Fitting a parabola.       9+3         Statement of values - Applications: Maxima and Minima of Munctions involving three constants of the form y atbx:cv <sup>*</sup> , y eax <sup>+</sup> e, y=ax <sup>+</sup> e - Method of RegulaFals method - System of Simultaneous Linear Equations: Direct Methods Gauss elimination relimits a straight line - Fitting a parabola.       9+3		22BCC12-MATHEMATICS - I						
Programme& Branch       B:Sc& Computer Systems       Information       Sem.       Category       L       T       P       Credit         Prequisites       Nil       I       BS       3       1*       2*       4         Preamble       The course aims to formulate and solve problems using matricas, differential equations and fitting the best curve to the given data. Eventually the course provides a thorough understanding of solving real work       9+3         Characteristic Equation of a matrix - Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors (statement only) - Orthogonal Matrices - Oftmogonal Transformation o Symmetric matrix to diagonal form - Quadratic forms - Reduction of Quadratic form to Canonical form by Orthogonal Transformation o Symmetric matrix to diagonal form - Quadratic forms - Cauting of functions - Continuity - Derivatives - Differentiation rule (sum, product, quotent, chain rules) - Applications: Maxima and Minian of functions of one variable. Orthogonal Transformation of symmetric matrix to diagonal forgon group averages: Fitting a straight line - Equations involving three constants by the method of group averages: Fitting a straight line - Fitting a parabola.       9+3         Evaluation of constants by the method of group averages: Fitting a straight line - Fitting a parabola.       9+3         Init - N       Solution of Algebraic and Transcoendental Equations: Solution of Algebraic and Transcoendental Equations: Group application       9+3         Election method - Newtor-Raphyson method - RegulaFalsi method - Simultane		(Common to Computer Systems and Design, Information S	ystems &	Software Sy	/ster	ns)		
Prerequisities       Nil       1       BS       3       1"       2"       4         Preamble       The course aims to formulate and solve problems using matrices, differential equations and fitting the best curve to the given data. Eventually the course provides a thorough understanding of solving real word problems only.       9+3         Characteristic Equation of a matrix - Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vector (statement only) - Orthogonal Matrices - Orthogonal Transformation o Symmetric matrix to diagonal form - Quadratic forms - Reduction of Quadratic form to Canonical form by Orthogonal Transformation o Symmetric matrix to diagonal curves - Applications: Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Applications: Linear differential equations of second order with constant coefficients when the RHS ise*, sin(ax), cos(ax), x" (n×0).         Unit - II       Curve Fitting:       9+3         Evaluation of constants by the method of group averages: Fitting a straight line - Equations involving three constants of the run y abvt-ck", y=abvt-ca was by aet*-us - Method of least squares: Fitting a straight line - Fitting a parabola.       9+3         Bisection method - Netwon-Raphson method - Regularial ration definementa. Equations involving three constants of the Hordo for uses solvana method.       9+3         Bisection method - Netwon-Raphson method - Regularials interhod - System of Simultaneous Linear Fequations: Under Methods Gauss Bindration formula - Lagrange's inverse interpolation formula - Networ's divided difference method for	Programme& Branch	B.Sc& Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Ρ	Credit
Preamble       The course aims to formulate and solve problems using matrices, differential equations and fitting the best curve to the given data. Eventually the course provides a thorough understanding of solving real word problems using numerical methods.         Unit - 1       Matrices:       9+3         Characteristic Equation of a matrix - Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors (statement only) - Orthogonal Matrices - Orthogonal Transformation o Symmetric matrix to diagonal form - Quadratic form - Quadratic form to Canonical form by Orthogonal Transformation of Symmetric matrix to diagonal poblems only: Applications: Maxima and Minima of function - Continuity - Derivates - Differentiation rule (sum, product, quotient, chain rules) - Applications: Maxima and Minima of functions of one variable. Ordinary Differentia Equations of second order with constant coefficients when the RHS ise <sup>m</sup> , sin(ax), cos(ax), x <sup>4</sup> (n>0).         Unit - II       Curve Fitting:       9+3         Evaluation of constants by the method of group averages: Fitting a straight line - Equations: Incord May aet <sup>3*</sup> e - Method of least squares: Fitting a straight line - Fitting a parabola.       9+3         Bisection method - Neuton-Raphson method - Regulariasi method - System of Simultaneous Linear Equations: Incord Methods Gauss Binnihous method - Gauss Solvan method - Regulariasi method - System of Simultaneous Linear Equations: Incord Rulehods Gauss Binnihous method - Gauss Solvan method - Solvang Sindevan Arabison rules - Eigen quices and Eigen vectors         Unit - V       Interopolation:       9+3	Prerequisites	Nil	1	BS	3	1*	2*	4
Unit - I         Matrices:         943           Characteristic Equation of a matrix - Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors (statement and problems only) - Cayley-Hamiton Theorem (statement only) - Orthogonal Matrices - Orthogonal Transformation of Symmetric matrix to diagonal form - Quadratic forms - Reduction of Quadratic form to Canonical form by Orthogonal reduction.         943           Statement & Simple problems only. Representation of functions - Limit of a functions of one variable. Ordinary Differentiation rule (sum, product, quotient, chain rules) - Applications: Maxima and Minima of functions of one variable. Ordinary Differentiate equations: Linear differential equations of second order with constant coefficients when the RHS ise <sup>34</sup> , sin(ax), cos(ax), x <sup>4</sup> (n>0).           Unit - II         Curve Fitting:         9+3           Evaluation of constants by the method of group averages: Fitting a straight line - Equations involving three constants of the form y: a by x+cx <sup>2</sup> , y: a x <sup>4</sup> +c, y=ax <sup>4</sup> +c, y=ax <sup>4</sup> +c and y= ae <sup>10+</sup> + c - Method of least squares: Fitting a straight line - Fitting a parabola.         9+3           Bisection method - Newton-Raphson method - RegulaFaisi method - System of Simultaneous Linear Equations: Direct Methods Gauss allminator method - Gauss Jordan method. Iterative methods: Gauss Jacobi method - Gauss Selidel method         9+3           Inter Of EXPERIMENTS / EXERCISES:         9+3         9+3           1         Interpolation:         9+3           2         Computation of Lingh values and Eigen vectors         9+3           3         Not	Preamble	The course aims to formulate and solve problems using matricurve to the given data. Eventually the course provides a thorproblems using numerical methods.	ices, diffe rough un	erential equat derstanding o	tions of so	and f Iving i	itting th real wo	e best rld
Characteristic Equation of a matrix - Eigen values and Eigen vectors of real matrix - Properties of Eigen values and Eigen vectors and problem sonly) - Carkyel-Maniton Theorem (statement and problem sonly) - Carkyel-Maniton Theorem (statement and problem sonly) - Carkyel-Maniton Theorem (statement and problem sonly) - Carkyel-Maniton and functions - Limit of a function - Continuity - Derivatives - Differentiation rules (statement and using a problem sonly) - Carkyel-Manima of functions of one variable. Ordinary Differentia Equations: Linear differential equations of second order with constant coefficients when the RHS ise <sup>36</sup> , sin(ax), cos(ax), x <sup>n</sup> (n>0). Unit - III Curve Fitting: 9+3 Evaluation of constants by the method of group averages: Fitting a straight line - Equations involving three constants of the form y: abx+cc <sup>2</sup> , y=ab^+c- and y= ae <sup>36</sup> + c - Method of least squares. Fitting a straight line - Fitting a parabola. Unit - IV Solution of Algebraic and Transcendental Equations: Interpolation: 9+3 Bisection method - Newton-Raphson method. RegulaFalsi method - System of Simultaneous Linear Equations: Direct Methods Gauss elimination method - Gauss Jordon method. Teative methods: Gauss Jacobi method - Gauss Sidel method Unit - V Interpolation: 9+3 Interpolation with equal Intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference methods: Gauss Jacobi method - Gauss Sidel method Unit - V Interpolation formula - Lagrange's interpolation formula.  LIST OF EXPERIMENTS / EXERCISES: 1. Introduction to MATLAB 2. Computation of limits and derivatives 3. Plotting and visualizing single variable functions 4 4. Determination of limits and derivatives 4. Computed intervediate values using Lagrange's interpolation formula 4. Veerarajan T, "Engineering Mathematics for first year", 3 <sup>ord</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I, II. 2. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", Schand& Co, New Delhi, 2019 or Unit III, III, V. 4	Unit – I	Matrices:						9+3
Unit - II     Differential Calculus:     9+3       Statement & simple problems only: Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rule (sum, product, quotient, chain rules) - Applications: Maxima and Minima of functions of one valueb. Ordinary Differentiat Equations: Linear differential equations of second order with constant coefficients when the RHS ise**, sin(ax), cos(ax), x* (n>0).       Unit - III     Curve Fitting:     9+3       Evaluation of constants by the method of group averages: Fitting a straight line - Equations involving three constants of the form y abx+cx?, y=ax*c, y=ax*c, and y=ae**, c - Method of least squares: Fitting a straight line - Fitting a parabola.     9+3       Unit - V     Solution of Algebraic and Transcendental Equations:     9+3       Bisection method - Newton-Raphson method. RegulaFalsi method - System of Simultaneous Linear Equations:     9+3       Interpolation     Method - Gauss Jordan method. Iterative methods: Gauss Jacobi method - Gauss Seidel method Ouit - V     Interpolation:     9+3       Interpolation with equal intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula.     9+3       2.     Computation of Iimits and derivatives     9       3.     Plotting and visualizing single variable functions     9       4.     Determination of limits and derivatives     9       5.     Curve fitting for variable as a function of a predictor variable     7	Characteristic Eq (statement and p Symmetric matrix	uation of a matrix - Eigen values and Eigen vectors of real mature roblems only) - Cayley-Hamilton Theorem (statement only) - Or to diagonal form - Quadratic forms - Reduction of Quadratic form	rix - Prop thogonal to Canc	perties of Eig Matrices - C Inical form by	en v Ortho Vortl	alues Igonal Nogon	and Ei Transf al redu	gen vectors ormation o ction.
Statement & simple problems only: Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rule (sum, product, quotient, chain rules) - Applications: Maxima and Minima of functions of one variable. Ordinary Differentia Equations: Linear differential equations of second order with constant coefficients when the RHS ise <sup>™</sup> , sin(ax), cos(ax), ** (n=0). Unit - III Curve Fitting: 9+3 Evaluation of constants by the method of group averages: Fitting a straight line - Equations: involving three constants of the form y: a bx+cx <sup>2</sup> , y = ax <sup>6</sup> +c, y=ab <sup>+</sup> +c and y = ae <sup>I™</sup> + c - Method of least squares: Fitting a straight line - Fitting a parabola. Unit - IV Solution of Algebraic and Transcendental Equations: Bisection method - Newton-Raphson method. RegulaFalsi method - System of Simultaneous Linear Equations: Direct Methods Gauss elimination method - Gauss Jordan method. Iterative methods: Gauss Jacobi method - Gauss Seidel method Unit - V Interpolation: 9+3 Bisection method - Newton-Gregory forward and backward difference formula - Newton's divided difference methor for unequal intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference methor for unequal intervals: - Lagrange's interpolation formula - Lagrange's inverse interpolation formula. LIST OF EXPERIMENTS / EXERCISES: 1. Introduction to MATLAB 2. Computation of Eigen values and Eigen vectors 3. Plotting and visualizing single variable functions 4. Determination of limits and derivatives 5. Curve fitting for variable as a function of a predictor variable 6. Finding positive root by Regula – Falsi method 7. Solving simultaneous linear equations by Gauss – Seidel Method 8. Compute intermediate values using Lagrange's interpolation formula *Alternate week Lecture:45, Practical:15, Total:60 TEXT BOOK: 1. Veerarajan T, "Engineering Mathematics for first year", 3rd Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I, II. 2. Kandasamy P, Thilagavathy K, Gunavathy K, "Nu	Unit – II	Differential Calculus:						9+3
Unit – III       Curve Fitting:       9+3         Evaluation of constants by the method of group averages: Fitting a straight line - Equations involving three constants of the form ys a+b×+cx <sup>2</sup> , y= ax <sup>b</sup> +c, y=ab <sup>b</sup> +c c and y= ae <sup>bx</sup> + c - Method of least squares: Fitting a straight line - Fitting a parabola.         Unit – IV       Solution of Algebraic and Transcendental Equations:       9+3         Bisection method - Newton-Raphson method -RegulaFalsi method - System of Simultaneous Linear Equations: Direct Methods       9+3         Inter V       Interpolation:       9+3         Interpolation with equal intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula.       9+3         LIST OF EXPERIMENTS / EXERCISES:       1       Introduction to MATLAB       9+3         2.       Computation of Eigen values and Eigen vectors       9       9         3.       Plotting and visualizing single variable functions       9       9         4.       Determination of limits and derivatives       5       Curve fitting for variable as a function of a predictor variable         6.       Finding positive root by Regula – Falsi method       9       9         7.       Solving simultaneous linear equations by Gauss – Seidel Method       9       1         8.       Compute intermediate values using Lagrange's interpol	Statement & simp (sum, product, q Equations: Linea	ole problems only: Representation of functions - Limit of a functi uotient, chain rules) - Applications: Maxima and Minima of f ar differential equations of second order with constant coefficients	on - Cor functions when th	tinuity - Deri of one vari e RHS ise <sup>ax</sup> ,	vativ iable sin(a	res - E . <b>Ord</b> ax), co	Differen <b>linary</b> os(ax), >	tiation rules <b>Differentia</b> < <sup>n</sup> (n>0).
Evaluator of constants by the method of group averages: Fitting a straight line - Equations involving three constants of the form y- a+bx+cx <sup>2</sup> , y = ax <sup>0+</sup> c, y =ab <sup>0+</sup> c and y = ae <sup>bx+</sup> c C Method of least squares: Fitting a straight line - Fitting a parabola. Unit – IV Solution of Algebraic and Transcendental Equations: Siscetion method - Newton-Raphson method - RegulaFalsi method - System of Simultaneous Linear Equations: Direct Methods Gauss Jordan method. Iterative methods: Gauss Jacobi method - Gauss Seidel method Gauss elimination method - Gauss Jordan method. Iterative methods: Gauss Jacobi method - Gauss Seidel method Unit – V Interpolation: 9+3 Interpolation with equal intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula - Newton's divided difference method Computation of Eigen values and Eigen vectors Computation of Mints and derivatives Curve fitting for variable as a function of a predictor variable Finding positive root by Regula – Falsi method Compute intermediate values using Lagrange's interpolation formula *Alternate week Lecture:45, Practical:15, Total:60 TEXT BOOK: Net Candasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III, IV, V. REFERENCES MANUAL / SOFTWARE: Net Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019. Jain M, K, Iyenkar S, R, K, Jain R, K, "Numerical Methods for Scientific and Engine	Unit – III	Curve Fitting:						9+3
Unit – IV       Solution of Algebraic and Transcendental Equations:       9+3         Bisection method - Newton-Raphson method - RegulaFalsi method - System of Simultaneous Linear Equations:       Direct Methods         Gauss elimination method - Gauss Jordan method. Iterative methods:       Solution of Algebraic and Transcendental Equations:       Direct Methods         Unit – V       Interpolation:       9+3       Interpolation:       9+3         Interpolation with equal intervals:       Newton-Gregory forward and backward difference formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula.       9+3         Interpolation to MATLAB       Introduction to MATLAB       1       Introduction to MATLAB         2.       Computation of Eigen values and Eigen vectors       2       2         3.       Plotting on divisualizing single variable functions       2       2         4.       Determination of limits and derivatives       2       2         5.       Curve fitting for variable as a function of a predictor variable       4       2         6.       Finding positive root by Regula – Falsi method       3       2         7.       Solving simultaneous linear equations by Gauss – Seidel Method       3       2         8.       Compute intermediate values using Lagrange's interpolation formula	Evaluation of con a+bx+cx <sup>2</sup> , y= ax <sup>b</sup> -	stants by the method of group averages: Fitting a straight line - +c, y=ab <sup>x</sup> +c and y= ae <sup>bx</sup> + c - Method of least squares: Fitting a str	Equation raight line	s involving th e - Fitting a p	iree arab	consta ola.	ants of	the form y=
Bisection method - Newton-Raphson method -RegulaFalsi method - System of Simultaneous Linear Equations: Direct Methods Gauss elimination method - Gauss Jordan method. Iterative methods: Gauss Jacobi method - Gauss Seidel method Unit – V Interpolation: 9+3 Interpolation with equal intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula. LIST OF EXPERIMENTS / EXERCISES: 1. Introduction to MATLAB 2. Computation of Eigen values and Eigen vectors 3. Plotting and visualizing single variable functions 4. Determination of limits and derivatives 5. Curve fitting for variable as a function of a predictor variable 6. Finding positive root by Regula – Falsi method 7. Solving simultaneous linear equations by Gauss – Seidel Method 8. Compute intermediate values using Lagrange's interpolation formula *Alternate week Lecture:45, Practical:15, Total:60 TEXT BOOK: 1. Veerarajan T, "Engineering Mathematics for first year", 3 <sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II. 2. Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III,IV,V. REFERENCES/ MANUAL / SOFTWARE: 1. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", Schand& Co, New Delhi, 2019. 2. Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020. 3. MATLAB Manual.	Unit – IV	Solution of Algebraic and Transcendental Equations:						9+3
Unit - V       Interpolation:       9+3         Interpolation with equal intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula.       9+3         LIST OF EXPERIMENTS / EXERCISES:       1       Introduction to MATLAB       2         2.       Computation of Eigen values and Eigen vectors       3       Plotting and visualizing single variable functions         4.       Determination of limits and derivatives       5         5.       Curve fitting for variable as a function of a predictor variable       6         6.       Finding positive root by Regula – Falsi method       7         7.       Solving simultaneous linear equations by Gauss – Seidel Method       8         8.       Compute intermediate values using Lagrange's interpolation formula       *Atternate week         Lecture:45, Practical:15, Total:60         TEXT BOOK:         1.       Veerarajan T, "Engineering Mathematics for first year", 3 <sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.         2.       Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III./V.V.         REFERENCES/ MANUAL / SOFTWARE:         1.       Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, Ne	Bisection method Gauss elimination	- Newton-Raphson method -RegulaFalsi method - System of method - Gauss Jordan method. Iterative methods: Gauss Jaco	Simultan bi metho	eous Linear d - Gauss Se	Equ idel	ations metho	: Dire	ct Methods
Interpolation with equal intervals: Newton-Gregory forward and backward difference formula - Newton's divided difference method for unequal intervals - Lagrange's interpolation formula - Lagrange's inverse interpolation formula.  LIST OF EXPERIMENTS / EXERCISES:  1. Introduction to MATLAB 2. Computation of Eigen values and Eigen vectors 3. Plotting and visualizing single variable functions 4. Determination of limits and derivatives 5. Curve fitting for variable as a function of a predictor variable 6. Finding positive root by Regula – Falsi method 7. Solving simultaneous linear equations by Gauss – Seidel Method 8. Compute intermediate values using Lagrange's interpolation formula *Alternate week Lecture:45, Practical:15, Total:60 TEXT BOOK: 1. Veerarajan T, "Engineering Mathematics for first year", 3rd Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II. 2. Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III,IV,V. REFERENCES/ MANUAL / SOFTWARE: 1. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019. 2. Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020. 3. MATLAB Manual.	Unit – V	Interpolation:						9+3
1.       Introduction to MATLAB         2.       Computation of Eigen values and Eigen vectors         3.       Plotting and visualizing single variable functions         4.       Determination of limits and derivatives         5.       Curve fitting for variable as a function of a predictor variable         6.       Finding positive root by Regula – Falsi method         7.       Solving simultaneous linear equations by Gauss – Seidel Method         8.       Compute intermediate values using Lagrange's interpolation formula         *Alternate week         Lecture:45, Practical:15, Total:60         TEXT BOOK:         1.       Veerarajan T, "Engineering Mathematics for first year", 3rd Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.         2.       Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III,IV,V.         REFERENCES/ MANUAL / SOFTWARE:         1.       Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019.         2.       Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.         3.       MATLAB Manual.	LIST OF EXPERI	als - Lagrange's interpolation formula - Lagrange's inverse interpolation	olation fo	irmula.				
<ul> <li>Computation of Eigen values and Eigen vectors</li> <li>Plotting and visualizing single variable functions</li> <li>Determination of limits and derivatives</li> <li>Curve fitting for variable as a function of a predictor variable</li> <li>Finding positive root by Regula – Falsi method</li> <li>Solving simultaneous linear equations by Gauss – Seidel Method</li> <li>Compute intermediate values using Lagrange's interpolation formula</li> <li>*Alternate week</li> <li>Lecture:45, Practical:15, Total:60</li> <li>TEXT BOOK:</li> <li>Veerarajan T, "Engineering Mathematics for first year", 3rd Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.</li> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V.</li> <li>REFERENCES/ MANUAL / SOFTWARE:</li> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019.</li> <li>Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.</li> <li>MATLAB Manual.</li> </ul>	1. Introduct	ion to MATLAB						
<ul> <li>Plotting and visualizing single variable functions</li> <li>Determination of limits and derivatives</li> <li>Curve fitting for variable as a function of a predictor variable</li> <li>Finding positive root by Regula – Falsi method</li> <li>Solving simultaneous linear equations by Gauss – Seidel Method</li> <li>Compute intermediate values using Lagrange's interpolation formula</li> <li>*Alternate week</li> </ul> Lecture:45, Practical:15, Total:60 TEXT BOOK: 1. Veerarajan T, "Engineering Mathematics for first year", 3 <sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II. 2. Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III,IV,V. REFERENCES/ MANUAL / SOFTWARE: 1. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019. 3. MATLAB Manual.	2. Computa	tion of Eigen values and Eigen vectors						
<ul> <li>4. Determination of limits and derivatives</li> <li>5. Curve fitting for variable as a function of a predictor variable</li> <li>6. Finding positive root by Regula – Falsi method</li> <li>7. Solving simultaneous linear equations by Gauss – Seidel Method</li> <li>8. Compute intermediate values using Lagrange's interpolation formula</li> <li>*Alternate week</li> </ul> <b>TEXT BOOK:</b> <ol> <li>1. Veerarajan T, "Engineering Mathematics for first year", 3<sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi, 2012, for Unit I,II. 2. Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V. <b>REFERENCES/ MANUAL / SOFTWARE:</b> 1. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019. 3. MATLAB Manual.</li></ol>	3. Plotting a	and visualizing single variable functions						
<ul> <li>5. Curve fitting for variable as a function of a predictor variable</li> <li>6. Finding positive root by Regula – Falsi method</li> <li>7. Solving simultaneous linear equations by Gauss – Seidel Method</li> <li>8. Compute intermediate values using Lagrange's interpolation formula</li> <li>*Alternate week</li> </ul> <b>TEXT BOOK:</b> <ol> <li>Veerarajan T, "Engineering Mathematics for first year", 3rd Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.</li> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V.</li> </ol> <b>REFERENCES/ MANUAL / SOFTWARE:</b> <ol> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019.</li> <li>Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.</li> <li>MATLAB Manual.</li> </ol>	4. Determin	ation of limits and derivatives						
<ul> <li>6. Finding positive root by Regula – Falsi method</li> <li>7. Solving simultaneous linear equations by Gauss – Seidel Method</li> <li>8. Compute intermediate values using Lagrange's interpolation formula</li> <li>*Alternate week</li> <li>*Alternate week</li> <li>Lecture:45, Practical:15, Total:60</li> <li>TEXT BOOK:</li> <li>1. Veerarajan T, "Engineering Mathematics for first year", 3<sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.</li> <li>2. Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V.</li> <li>REFERENCES/ MANUAL / SOFTWARE:</li> <li>1. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019.</li> <li>2. Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.</li> <li>3. MATLAB Manual.</li> </ul>	5. Curve fitt	ing for variable as a function of a predictor variable						
<ul> <li>7. Solving simultaneous linear equations by Gauss – Seidel Method</li> <li>8. Compute intermediate values using Lagrange's interpolation formula</li> <li>*Alternate week</li> <li>Lecture:45, Practical:15, Total:60</li> <li>TEXT BOOK:</li> <li>1. Veerarajan T, "Engineering Mathematics for first year", 3<sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.</li> <li>2. Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V.</li> <li>REFERENCES/ MANUAL / SOFTWARE:</li> <li>1. Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019.</li> <li>2. Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.</li> <li>3. MATLAB Manual.</li> </ul>	6. Finding p	positive root by Regula – Falsi method						
<ul> <li>*Alternate week</li> <li><u>Lecture:45, Practical:15, Total:60</u></li> <li>TEXT BOOK:         <ol> <li>Veerarajan T, "Engineering Mathematics for first year", 3<sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.</li> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V.</li> </ol> </li> <li>REFERENCES/ MANUAL / SOFTWARE:         <ol> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019.</li> <li>Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.</li> <li>MATLAB Manual.</li> </ol> </li></ul>	7. Solving s	imultaneous linear equations by Gauss – Seidel Method						
Lecture:45, Practical:15, Total:60         TEXT BOOK:         1.       Veerarajan T, "Engineering Mathematics for first year", 3 <sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.         2.       Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III,IV,V.         REFERENCES/ MANUAL / SOFTWARE:         1.       Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019.         2.       Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.         3.       MATLAB Manual.	*Alternate week	internediate values using Lagrange's interpolation formula						
TEXT BOOK:         1.       Veerarajan T, "Engineering Mathematics for first year", 3 <sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.         2.       Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand& Co, New Delhi, 2019 for Unit III,IV,V.         REFERENCES/ MANUAL / SOFTWARE:         1.       Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019.         2.       Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.         3.       MATLAB Manual.				Lectu	re:4	5, Pra	ctical:1	5, Total:60
<ol> <li>Veerarajan T, "Engineering Mathematics for first year", 3<sup>rd</sup> Edition, Tata McGraw-Hill, NewDelhi , 2012, for Unit I,II.</li> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V.</li> <li>REFERENCES/ MANUAL / SOFTWARE:         <ol> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019.</li> <li>Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.</li> <li>MATLAB Manual.</li> </ol> </li> </ol>	TEXT BOOK:							
<ol> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEdition, S.Chand&amp; Co, New Delhi, 2019 for Unit III,IV,V.</li> <li>REFERENCES/ MANUAL / SOFTWARE:         <ol> <li>Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand&amp; Co, New Delhi, 2019.</li> <li>Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.</li> <li>MATLAB Manual.</li> </ol> </li> </ol>	1. Veeraraja	an T, "Engineering Mathematics for first year", 3 <sup>rd</sup> Edition, Tata Mo	cGraw-H	ill, NewDelhi	, 20′	12, for	r Unit I,I	Ι.
REFERENCES/ MANUAL / SOFTWARE:         1.       Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019.         2.       Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.         3.       MATLAB Manual.	2. Kandasa III,IV,V.	my P, Thilagavathy K, Gunavathy K, "Numerical Methods", 3rdEd	lition, S.C	Chand& Co, N	lew	Delhi,	2019 f	or Unit
1.       Kandasamy P, Thilagavathy K, Gunavathy K, "Engineering Mathematics for first year", S.Chand& Co, New Delhi, 2019.       Jain M.K, Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and Engineering Computation", 8th Edition, New Age International, New Delhi, 2020.         3.       MATLAB Manual.	REFERENCES/	IANUAL / SOFTWARE:						
3. MATLAB Manual.	1. Kandasa 2. Jain M.K. Internatio	my P, Thilagavathy K, Gunavathy K, "Engineering Mathematics in Iyenkar S.R.K, Jain R.K, "Numerical Methods for Scientific and E Innal, New Delhi, 2020.	for first y Engineeri	ear", S.Chan ng Computat	id& ( ion",	Co, Ne 8th E	ew Delh Edition,	ii, 2019. New Age
	3. MATLAR	Manual.						

COUR On co	SE OI mplet	UTCON	IES: the cour	se, the s	tudents	s will be	able to	1						BT Mapped (Highest Lev	d /el)	
CO1 interpret the basics of matrix and finding the Eigen values and Eigen Vector of a real matrix														Applying (K3)		
CO2 apply differential calculus tools in solving various application problems and the second orde linear differential equations													er	Applying (K3)		
CO3	CO3fitting a curve to the given data using different methodsApplying (K3)														3)	
CO4 apply various numerical techniques to solve algebraic and transcendental equations Applying (K3)														3)		
CO5	CO5 illustrate interpolation techniques for equal and unequal intervals Applying (K3)													3)		
CO6	CO6       know the basics of MATLAB, compute Eigen vectors of real matrix, plot and determine limits and derivatives of a given real function, fit a curve for a given data, find the roots of algebraic equations and find interpolate unequal data by using MATLAB.       Understanding (K2) Manipulation(S2)													(K2) S2)		
						Марр	ing of C	Os wit	h POs	and PS	Os			1		
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1		3	3	2										1		
CO2		3	3											1		
CO3		3	2	1	T					Τ						
CO4		3	3											1		
CO5		3	2													
CO6						3										
1 – Slię	ght, 2	– Mode	erate, 3 -	- Substan	tial, BT	- Bloom'	s Taxon	omy				·				
						ASSE	SSMEN		TERN		۲Y					
Tes C	t / Blo atego	oom's ory*	Re	memberi (K1) %	ng l	Jndersta (K2)	anding %	Appl (K3)	ying %	Analyz (K4) 9	ing E %	Evaluating (K5) %	Crea	ating (K6) %	Total %	
	CAT	1		10		20		7(	)	-		-		-	100	
	CAT	2		10		30		60	)	-		-		-	100	
	CAT	3		10		30		60	)	-		-		-	100	
	ESE			10		25		65	5	-		-		-	100	
* ±3%	may b	e varie	d (CAT <sup>·</sup>	1,2,3 – 50	marks	& ESE -	- 100 ma	arks)								
	22BCT11 - DIGITAL PRINCIPLES AND LO	OGIC DES	IGN													
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	(Common to Computer Systems and Design, Information	Systems 8	Software Sy	stem	s)											
Programme & Branch	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Р	Credit									
Prerequisites	Nil	1	BS	3	0	0	3									
Preamble	To deal with the basic principles of number systems and Bo concepts of combinational and synchronous sequential logic	olean algel circuits.	bra and to exe	empl	ify th	e fund	amental									
Unit – I	Digital Systems and Logic Gates:						9									
Digital systems - Binary Numbers - Number Base Conversions - Decimal Numbers - Octal and Hexadecimal Numbers - Complement of Numbers: 1's Complement - 2's Complement. Binary codes - Digital logic gates.																
Unit – II Boolean Algebra and Minimization Techniques: 9																
Introduction to Boolean Algebra - Basic theorems and properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms. Gate-Level Minimization: The Map method - Two, Three, Four Variable K-Map - Product Of Sums Simplification - Don"t care conditions - NAND and NOR Implementation																
Unit – III	Unit – III Combinational Logic: 9															
Introduction - Co Subtractor - Deco	mbinational circuits - Analysis of Combinational Circuits - Des oders - Encoders - Multiplexers - Demultiplexer.	ign: Half A	dder - Full A	dder	' - Ha	alf Sub	otractor - Full									
Unit – IV	Synchronous Sequential Logic:						9									
Introduction -Seq T Flip-Flop. Analy	uential circuits - Storage Elements - Latches: SR Latch - D latch. sis of Clocked Sequential Circuits: Analysis of D Flip-Flops - Analysis	Flip-Flops alysis of T	:: SR Flip-Flop Flip-Flops	) - D	Flip-	Flop -	JK Flip-Flop -									
Unit – V	Registers and Counters:						9									
Registers - Types D Flip flops - Ring	s of Shift Registers: SISO - SIPO - PISO - PIPO - Universal Shift g Counters - Johnson Counter.	Register -	Binary Synch	rono	us C	ounter	s using T and									
							Total:45									
TEXT BOOK:																
1. M. Morris Mano and Michael D. Ciletti, "Digital Design", 6th Edition, Pearson, India, 2020.																
REFERENCES:																
1. Floyd L.	Thomas, "Digital Fundamentals", 11th Edition, Pearson Education	n, Delhi, 20	18.													
2. Givone Donald D., "Digital Principles and Design", Tata McGraw-Hill Education, Delhi, 2017.																
I																

COURS	OURSE OUTCOMES:													BT Mapped (Highest Level)			
On con	npietio	on of t	ne cours	se, the st	udents		able to							(Fignest	Levei)		
CO1	solve	proble	ems relate	ed to num	ber bas	e conve	rsions a	nd bina	ry code	s.			l	Jnderstand	ling (K2)		
CO2	CO2 apply the concept of Boolean algebra and to implement minimization techniques.														(K3)		
CO3	CO3 design the basic combinational circuits.														(K3)		
CO4	CO4 demonst the functions of basic flip-flops.													Applying (K3)			
CO5	apply	the co	oncepts o	of registers	s and co	unters.								Applying	(K3)		
						Маррі	ing of C	Os with	n POs a	and PS(	Ds						
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1		2	1											3	2		
CO2	CO2 3 2 1 1 1 1													2	3		
CO3	3	3	2	1	1		1							2	3		
CO4	ŀ	3	2	1	1		1							2 3			

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

CO5

ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	30	40	30	-			100						
CAT2	30	35	35	-			100						
CAT3	30	40	30				100						
ESE	ESE 30 40 30 100												
* ±3% may be varied (	* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

	22BCT12 – PROBLEM SOLVING AND PROGRAMMING IN C (Common to Computer Systems and Design Information Systems & Software Systems)													
	(Common to Computer Systems and Design, Information S	Systems	& Software Sy	vstems)										
Programme & Branch	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem	Category	L	Т	Ρ	Credit							
Prerequisites	Nil	1	PC	3	0	0	3							
Preamble	This course introduces the fundamentals of computers and programs using looping and conditional statements, function	program	ming and emp array.	hasizes	s on dev	/elopi	ng c							
Unit – I	Introduction to Problem Solving:						9							
Overview of Comput Planning the compu values of two variable	Overview of Computers – Applications of Computers – Characteristics of Computer – Basic Computer organization – Problem Solving: Planning the computer program – Algorithms – Flowcharts – Pseudocodes – Structuring the logic. Case Studies: Exchanging the values of two variables – Finding the biggest number – Summation of Numbers- Factorial computation.													
Unit – II     Introduction to C:     9														
Introduction – Characteristics – Program Structure – Files used in C – Compiling and executing programs – Comments – Tokens - character set – keywords – Identifiers – Data Types – Variables – Constants – Input / Output Statements – Operators –Type conversion and typecasting- Preprocessor Directives: Introduction – Types of Preprocessor Directives.														
Unit – III	Decision Control and Looping Statements:						9							
Introduction – Condit	ional Branching Statements: if, if-else, if-else-if, switch case -	Iterative	statements: w	/hile, do	-while a	and fo	or loop -							
Nested loops – break	and continue statements – goto statement. Case Studies: Ro	oman nu	mber represer	ntation -	- day of	the v	veek.							
Unit – IV	Functions:	romotor	a ta functionu a			ط ممال	9							
reference – scope of – Recursion versus I	variables: block, function, program and files – storage classes teration.	s: auto, s	static, register	and ext	ern- red	cursiv	e functions							
Unit – V	Arrays & Strings:						9							
Arrays: Introduction passing two-dimensi strncat(), strcmp(), st	<ul> <li>declaration – accessing the elements – storing values –pa onal arrays to functions. Strings: Introduction – suppressi rncmp(),strcpy(),strncpy() and strlen() - Arrays of Strings.</li> </ul>	issing ar ng input	rays to functio t – String ma	ons – tw nipulatio	o-dime on Fun	nsion ctions	al arrays – s : strcat(),							
							Total:45							
TEXT BOOK:	TEXT BOOK:													
1. Reema Th	areja, "Programming in C ", 2nd Edition, Oxford University Pre	ess, New	/ Delhi, 2018.											
<b>REFERENCES:</b>														
1. Yashavant	Kanetkar,"Let us C", 16th Edition, BPB Publications, 2018.													
2. Balagurusa	2. Balagurusamy E., "Programming in ANSI C", 7th Edition, Mc Graw Hill Education, 2017.													

COURSE OUTCOMES:       BT Mapped         On completion of the course, the students will be able to       (Highest Level)															
CO1	formulat	e simple	algorithn	ns for arithr	netic an	d logical	problems	5				Unde	erstanding	(K2)	
CO2	understa	and the b	asics of	c programm	ning							Unde	erstanding	(K2)	
CO3	identify t given pr	the appro oblem	priate lo	oping and c	control s	tatement	s in C for	provid	ding the solu	ution to th	e	A	pplying (K	3)	
CO4	decomp	ose a pro	blem inte	o functions	and syn	thesize a	a complet	e prog	jram			A	pplying (K	3)	
CO5       apply programming to solve problems related to arrays and strings       Applying (K3)														3)	
Mapping of COs with POs and PSOs															
COs/PO s	COs/PO s         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02														
CO1														3	
CO2	2	1							1	2	2	1	2	3	
CO3	3	2	1	1					2	3	3	2	2	3	
CO4	3	2	1	1					2	3	3	2	3	2	
CO5	3	2	1	1					2	3	3	2	2	3	
1 – Slight	, 2 – Mod	lerate, 3 -	- Substa	ntial, BT- B	loom's T	axonomy	1			Ľ		I			
					ASSE	SSMENT	PATTE	RN - T	HEORY						
Test / B	loom's C	Category	, Rer	nembering (K1) %	Unc din	derstan Ig (K2) %	Applyi (K3)	ng %	Analyzin g (K4) %	Evalu (K5	ating ) %	Creati	ng (K6) %	Tot al %	
	CAT1			40		60	-							100	
	CAT2 20 50 30 100														
	CAT3 20 40 40 100														
	ESE			20		30	50							100	
* +3% ma	v be vari	ed (CAT	1.2.3 – 5	0 marks &	ESE – 1	00 mark	s)								

	22BCT13 – WEB PROGRAMMING													
	(Common to Computer Systems and Design, Information Syste	ms & Sot	ftware Systen	ns)										
Programme & Branch	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	Т	Ρ	Credit							
Prerequisites	Nil	1	PC	3	0	0	3							
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Preamble	To impart the basic structure and design of webpage using HTM in open source server-side technologies like PHP with MySQL to	IL, CSS, o develop	client-side so o database dr	riptir iven	ig an web	d prog applic	gramming cations							
Unit – I	Fundamentals of HTML:						9							
Understanding Elen Exploring Hyperlink	Understanding Elements – Describing Data Types –Formatting Text with HTML Elements – Arranging Text – Displaying Lists – Exploring Hyperlinks and URL – Creating Tables – Inserting Images, Exploring Colors and Canvas – Working With Forms.													
Unit – II         Overview of CSS:         9           Evolution and Syntax – Exploring Selectors – Inserting CSS in HTML – Background and Color Properties – Font and Text Properties         9														
Evolution and Syntax – Exploring Selectors – Inserting CSS in HTML – Background and Color Properties – Font and Text Properties – Creating Boxes and Columns.														
Unit – III     Dynamic HTML and Javascripts:     9														
Exploring Features of Javascript – Usage in HTML document – Programming Fundamentals – Functions and Events – Built-in Objects –Document Object Model – Form Validation.														
Unit – IV     Introduction to PHP:     9														
PHP- MySQL- Deci Output Statements. – Passing Informati	PHP- MySQL- Deciding on a Web Application Platform – PHP Syntax- Comments – Variables – Types in PHP-Simple Datatypes – Output Statements. Control Structures and Functions: Boolean Expressions - Branching:- Looping – Functions and Variables Scope – Passing Information with PHP – Arrays.													
Unit – V	MySQL Database Integration:						9							
Introducing Databas Performing Databas Integrating Web Fo Data with HTML Fo	ses and MySQL: What is Database – Need – PHP Supported Data se Queries: HTML Tables and Database Tables - Complex Mappin prms and Databases: HTML Forms - Basic Form Submission to prm.	bases – ngs - Cre a Datat	Integrating Pl eating the Sa base - Self-S	HP a Imple ubm	nd M e Tal issio	ySQL bles - n - Ec	 diting							
							Total:45							
TEXT BOOK:														
1. DT Editoria DreamTecl	I Services, "HTML5 Black Book Covers CSS3, Javascript, HTML, Press, New Delhi, 2020. (for Units I, II, III)	XHTML,	AJAX, PHP a	and J	Quer	y", 2 <sup>n</sup>	<sup>d</sup> Edition,							
2. Suehring Steve, Converse Tim, Park Joyce, "PHP 6 and MYSQL6 Bible", 1 <sup>st</sup> Edition, Wiley Publications, New Delhi, 2017. (for Units IV, V)														
REFERENCES:														
1. Welling Lu	ke, Thomson Laura, "PHP and MySQL Web Development", 5 <sup>th</sup> Edi	tion, Pea	arson Educatio	on, L	lttar F	Prade	sh, 2020.							
2. Nixon Rob Distributor	in, "Learning PHP MySQL and Javascript with Jquery CSS and HT s Pvt Ltd., Mumbai, 2019.	<sup>-</sup> ML5", 4 <sup>tt</sup>	<sup>h</sup> Edition, Shro	off P	ublisł	ners a	Ind							

COURS On cor	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	illustrate web technology concepts and web page designing using basic HTML tags.	Applying (K3)
CO2	develop web pages and apply styles using CSS	Applying (K3)
CO3	design dynamic pages and perform client validation using javascript.	Applying (K3)
CO4	outline the programming constructs of PHP	Applying (K3)
CO5	develop web applications with database connectivity	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	2								2	3
CO2	3	2	1	1	2								2	3
CO3	3	2	1	1	2								2	3
CO4	3	2	1	1	2								2	3
CO5	3	2	1	1	2								2	3
4 01:11.0			<u> </u>		·									

ASSESSMENT PATTERN - THEORY														
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	30	40	30	-			100							
CAT2	30	30	40	-			100							
CAT3	30	30	40	-			100							
ESE	ESE 30 30 40 - 100													
* ±3% may be varied (C	AT 1,2,3 – 50 marks	& ESE - 100 marks	5)			·	·							

(Common to Computer Systems and Design, Information Systems & Software Systems)           Programme & Branch         BS.c & Computer Systems and Design, Information         Sem.         Category         L         T         P         Credit           Prerequisites         Nil         1         BS         0         0         4         2           Prerequisites         Nil         1         BS         0         0         4         2           Prerequisites         Nil         1         BS         0         0         4         2           Preamble         To provide the knowledge in the digital circuit design and implementation and to design the combinational and sequential circuits with the use of digital logic gates.         Userification of Logic Gates		22BCL11 - DIGITAL PRINCIPLES AND LOGIC DESIGN LABORATORY (Common to Computer Systems and Design, Information Systems & Software Systems)																					
Programme & Branch         B.Sc & Computer Systems and Design, Information Systems, Software Systems         Sem.         Category         L         T         P         Credit           Prerequisites         NI         I         BS         0         0         4         2           Preamble         To provide the knowledge in the digital circuit design and implementation and to design the combinational and sequential circuits with the use of digital logic gates.         II         BS         0         0         4         2           Iteration of Logic Gates         Iteration of Code Convertor         Iteration of Code Convertor         Iteration of Adder         Iteration of Adder         Iteration of Subtractor         Iteration of Subtractor         Iteration of Subtractor         Iteration of Sand JK Flip-flops         Iteration of Total S0         Iteration of Sand JK Flip-flops         Iteration of Sand JK Flip-flops         Iteration of Sand JK Flip-flops         Iteration of Total DFlip-flops         Iteration of Total S0         Iteration of Total S0         Iteration of Sand JK Flip-flops         Iteration of Total S0         Iteration of Total S0         Iteraticat			(	Commo	n to Co	mputer	System	is and [	Design,	Informa	tion Sys	stems &	Software Sy	/stems	)								
Preequisites         Nil         Inscription         Inscription <th< td=""><td>Progra Branci</td><td>amme h</td><td>&amp;</td><td>B.Sc Syste</td><td>&amp; Com ems, So</td><td>puter S ftware</td><td>ystems Systerr</td><td>and D</td><td>esign, I</td><td>Informa</td><td>ition</td><td>Sem.</td><td>Category</td><td>L</td><td>т</td><td>Ρ</td><td>Credit</td></th<>	Progra Branci	amme h	&	B.Sc Syste	& Com ems, So	puter S ftware	ystems Systerr	and D	esign, I	Informa	ition	Sem.	Category	L	т	Ρ	Credit						
Preamble       To provide the knowledge in the digital circuit design and implementation and to design the combinational and sequential circuits with the use of digital logic gates.         LIST OF EXPERIMENTS / EXERCISES:	Prereq	luisite	es	Nil								1	BS	0	0	4	2						
LIST OF EXPERIMENTS / EXERCISES:         1.       Verification of Logic Gates         2.       Verification of Code Convertor         3.       Verification of Parity Generator         4.       Verification of Adder         5.       Verification of Subtractor         6.       Verification of Encoder and Decoder         7.       Verification of Multiplexer and Demultiplexer         8.       Verification of SR and JK Flip-flops         9.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES: On completion of the course, the students will be able to         CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision(S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision(S3)         COS/POS         O PO3       PO4       PO5       PO6       PO7       PO8       PO1       PO1       PO1       PO1       PS0         CO2       3       2       1 <td>Pream</td> <td>ble</td> <td></td> <td>To pro comb</td> <td>ovide th inationa</td> <td>e knowl Il and se</td> <td>edge in equentia</td> <td>the dig al circui</td> <td>jital circ ts with t</td> <td>uit desig he use (</td> <td>gn and i of digita</td> <td>mpleme al logic ga</td> <td>ntation and a</td> <td>to desi</td> <td>gn tł</td> <td>he</td> <td></td>	Pream	ble		To pro comb	ovide th inationa	e knowl Il and se	edge in equentia	the dig al circui	jital circ ts with t	uit desig he use (	gn and i of digita	mpleme al logic ga	ntation and a	to desi	gn tł	he							
1.       Verification of Logic Gates         2.       Verification of Code Convertor         3.       Verification of Parity Generator         4.       Verification of Adder         5.       Verification of Subtractor         6.       Verification of Encoder and Decoder         7.       Verification of Multiplexer and Demultiplexer         8.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES: On completion of the course, the students will be able to         CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design procedures to design basic sequential circuits.       Applying (K3), Precision (S3)         COS/POS         PO1       PO2         Mapping of Cos with POs and PSOs         CO2/2       3         COS/PO3       PO1       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02	LIST C	OF EXP	PERIN	IENTS	/ EXER	CISES:																	
2.       Verification of Code Convertor         3.       Verification of Parity Generator         4.       Verification of Adder         5.       Verification of Subtractor         6.       Verification of Encoder and Decoder         7.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES: On completion of the course, the students will be able to         CO1       demonstrate various digital ICs and implement the functionalities.       Paplying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         Cos/POs         Mapping of Cos with POs and PSOs         COs/POs         COS/POS         PO1       PO2         PO5       PO6         CO1       3       2       1         Cos/PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO1       PO1       PO1       <	1.	Veri	ficatio	n of Log	jic Gate	S																	
3.       Verification of Parity Generator         4.       Verification of Adder         5.       Verification of Subtractor         6.       Verification of Encoder and Decoder         7.       Verification of Multiplexer and Demultiplexer         8.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES:         On completion of the course, the students will be able to         CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         COs/POs         Mapping of Cos with POs and PSOs         COs/POs       PO1         PO2       PO3         Cos PO1       PO2       PO3       PO6       PO7       PO8       PO9       PO10       PO1       PO12       PS01       PS02       G3         CO2       3       2 <t< td=""><td>2.</td><td>Veri</td><td>ficatio</td><td>n of Coo</td><td>de Conv</td><td>vertor</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	2.	Veri	ficatio	n of Coo	de Conv	vertor																	
4.       Verification of Adder         5.       Verification of Subtractor         6.       Verification of Encoder and Decoder         7.       Verification of Multiplexer and Demultiplexer         8.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES:         ONTOOMES:         ONTOOMES: </td <td>3.</td> <td>Veri</td> <td>ficatio</td> <td>n of Par</td> <td>ity Gen</td> <td>erator</td> <td></td>	3.	Veri	ficatio	n of Par	ity Gen	erator																	
5.       Verification of Subtractor         6.       Verification of Encoder and Decoder         7.       Verification of Multiplexer and Demultiplexer         8.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURS: OUTCOMES: ON the course, the students will be able to         CO1       demonstrate various digital ICs and implement the functionalities.         Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         COs/Pos         PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       2       1       1       0       0       0       2       3         CO2       3       2       1       1       0       0       2       3	4.	Verification of Adder																					
6.       Verification of Encoder and Decoder         7.       Verification of Multiplexer and Demultiplexer         8.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES:         On completion of the course, the students will be able to         COURSE OUTCOMES:         O1       demonstrate various digital ICs and implement the functionalities.         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision (S3)         Cos/Pos       P01       P02       P03       P04       P05       P06       P07       P08       P09       P011       P012       PS01       PS02         CO1       3       2       1       1       0       0       2       3         CO2       3       2       1       1       0       0       2       3	5.	Verification of Subtractor																					
7.       Verification of Multiplexer and Demultiplexer         8.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES:         On completion of the course, the students will be able to         CO1       demonstrate various digital ICs and implement the functionalities.         CO2       design basic combinational circuits and verify their functionalities.         CO3       apply the design procedures to design basic sequential circuits.         Mapping of Cos with POs and PSOs         Cos/Pos         PO1         PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       2       1       1       1       2       3       3         CO2       3       2       1       1       1       2       3       3       2       3       2       3	6.	Verification of Encoder and Decoder																					
8.       Verification of SR and JK Flip-flops         9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES: On completion of the course, the students will be able to         CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision(S3)         Mapping of Cos with POs and PSOs         COs/POs       P01       P02       P03       P04       P05       P06       P07       P08       P09       P010       P011       P012       PS01       PS02         CO1       3       2       1       1	7.	Verification of Multiplexer and Demultiplexer																					
9.       Verification of T and D Flip-flops         10.       Verification of Binary and BCD counter         Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES: On completion of the course, the students will be able to       BT Mapped (Highest Level)         COI       design basic combinational circuits and wrify their functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)       Applying (K3), Precision (S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision(S3)         COs/POs       PO1       PO2       PO3       PO4       PO5       PO1       PO1 <td>8.</td> <td>Veri</td> <td>ficatio</td> <td>n of SR</td> <td>and JK</td> <td>Flip-flo</td> <td>ps</td> <td></td>	8.	Veri	ficatio	n of SR	and JK	Flip-flo	ps																
In the second s	9.	Veri	ficatio	n of T a	nd D Fli	p-flops																	
Total:60         REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         COURSE OUTCOMES: On completion of the course, the students will be able to       BT Mapped (Highest Level)         CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision(S3)         Mapping of Cos with POs and PSOs         COs/POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       2       1       1       4       4       2       3         CO2       3       2       1       1       4       4       2       3	10.	Veri	ficatio	n of Bin	ary and	BCD co	ounter																
REFERENCES/ MANUAL /SOFTWARE:         1.       Laboratory Manual         BT Mapped (Highest Level)         COURSE OUTCOMES: On completion of the course, the students will be able to       BT Mapped (Highest Level)         CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision(S3)         Mapping of Cos with POs and PSOs         COs/POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       2       1       1       4       4       2       3         CO2       3       2       1       1       4       4       2       3																•	Total:60						
1.       Laboratory Manual         COURSE OUTCOMES: On completion of the course, the students will be able to       BT Mapped (Highest Level)         CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision(S3)         Mapping of Cos with POs and PSOs         COs/POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       2       1       1       4       4       2       3         CO2       3       2       1       1       4       2       3	REFE	RENCI	ES/ M	ANUAL	/SOFT	WARE:																	
COURSE OUTCOMES:BT Mapped (Highest Level)CO1demonstrate various digital ICs and implement the functionalities.Applying (K3), Precision (S3)CO2design basic combinational circuits and verify their functionalities.Applying (K3), Precision (S3)CO3apply the design procedures to design basic sequential circuits.Applying (K3), Precision(S3)Mapping of Cos with POs and PSOsCOs/POsPO1PO2PO3PO4PO5PO6PO7PO8PO9PO10PO11PO12PS01PS02CO132114423CO232114423CO332114423CO332114423	1.	Labo	oratory	/ Manua	al																		
On completion of the course, the students will be able to(Highest Level)CO1demonstrate various digital ICs and implement the functionalities.Applying (K3), Precision (S3)CO2design basic combinational circuits and verify their functionalities.Applying (K3), Precision (S3)CO3apply the design procedures to design basic sequential circuits.Applying (K3), Precision(S3)Mapping of Cos with POs and PSOsCos/POsPO1PO2PO3PO4PO5PO6PO7PO8PO9PO10PO11PO12PS01PS02CO132114423CO232114423CO332114423CO332114423	COUR	SE OL	лтсо	MES:											B	Т Мар	ped						
CO1       demonstrate various digital ICs and implement the functionalities.       Applying (K3), Precision (S3)         CO2       design basic combinational circuits and verify their functionalities.       Applying (K3), Precision (S3)         CO3       apply the design procedures to design basic sequential circuits.       Applying (K3), Precision (S3)         CO3         Mapping of Cos with POs and PSOs         COs/POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       2       1       1	On co	mpleti	ion of	the co	urse, th	e stude	ents wil	l be ab	le to						(Hig	hest l	_evel)						
CO2Applying (K3), Precision (S3)CO3apply the design procedures to design basic sequential circuits.Applying (K3), Precision (S3)CO3apply the design procedures to design basic sequential circuits.Applying (K3), Precision (S3)Mapping of Cos with POs and PSOsCOs/POsPO1PO2PO3PO4PO5PO6PO7PO8PO9PO10PO11PO12PS01COs/POsPO1PO2PO3PO4PO5PO6PO7PO8PO10PO11PO12PS01CO33211000023CO232110000023CO332110000023	CO1	dem	nonstra	ate varic	ous digit	al ICs a	nd impl	ement	the func	tionalitie	es.				Apj Pre	plying ecision	(K3), (S3)						
Applying (K3), Precision(S3)         Mapping of Cos with POs and PSOs         COs/POs       PO1       PO2       PO3       PO4       PO6       PO7       PO8       PO10       PO11       PO12       PSO1         COs/POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO10       PO11       PO12       PSO1       PSO2         CO2       3       2       1       1       PO10       PO11       PO12       PSO2       3         CO2       3       2       1       2       3         CO2       3       2       1       1       Applying (K3), precision(S3)         COS/POS       PO1       PO12       PSO2       2       3       2       3 <th <<="" colspan="6" td=""><td>CO2</td><td>desi</td><td>ign bas</td><td>sic com</td><td>bination</td><td>al circu</td><td>its and v</td><td>verify th</td><td>neir func</td><td>tionaliti</td><td>es.</td><td></td><td></td><td></td><td>Apj Pre</td><td>plying ecision</td><td>(K3), (S3)</td></th>	<td>CO2</td> <td>desi</td> <td>ign bas</td> <td>sic com</td> <td>bination</td> <td>al circu</td> <td>its and v</td> <td>verify th</td> <td>neir func</td> <td>tionaliti</td> <td>es.</td> <td></td> <td></td> <td></td> <td>Apj Pre</td> <td>plying ecision</td> <td>(K3), (S3)</td>						CO2	desi	ign bas	sic com	bination	al circu	its and v	verify th	neir func	tionaliti	es.				Apj Pre	plying ecision	(K3), (S3)
Mapping of Cos with POs and PSOs           COs/POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02           CO1         3         2         1         1              2         3           CO2         3         2         1         1              2         3           CO3         3         2         1         1               2         3	CO3	CO3apply the design procedures to design basic sequential circuits.Applying (K3), Precision(S3)																					
COs/POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02           CO1         3         2         1         1               2         3           CO2         3         2         1         1               2         3           CO3         3         2         1         1               2         3		Mapping of Cos with POs and PSOs																					
CO1       3       2       1       1       2       3         CO2       3       2       1       1       2       3         CO3       3       2       1       1       2       3	COs/P	COs/POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02																					
CO2         3         2         1         1         2         3           CO3         3         2         1         1         2         3	CO1		3	2	1	1										2	3						
	CO2	2	3	2	1	1										2	3						
	CO3	3	3	2	1	1		L								2	3						

		22BCL12	- C PROGRAMMING LABOR	ATORY											
	(Common to Computer Systems and Design, Information Systems & Software Systems)         Programme & Branch       B.Sc & Computer Systems and Design, Information Systems, Software Systems       Sem.       Category       L       T       P       Credit														
Progra Branc	amme & h	B.Sc & Computer System Systems, Software System	ns and Design, Information ems	Sem.	Category	L 1	P	Credit							
Prerec	uisites	Nil		1	PC	0 0	4	2							
Pream	ble	This course provides the k applying c programming c	nowledge in c programming. It oncepts and features.	emphasi	zes on develo	ping c	prograr	ns by							
LIST C	F EXPERI	MENTS / EXERCISES:													
1.	Write an	algorithm and draw a flowcha 1. Swapping of two var 2. Check voting eligibili 3. Find biggest among	rt using Raptor tool for the follor iables without using temporary ty of the user three numbers	wing, variable											
2.	Write an	algorithm and draw a flowcha 1. Print multiplication ta 2. Print the Fibonacci s	rt using Raptor tool for the follor able for the given number eries	wing,											
3.	Program	to demonstrate the usage of o	different operators like arithmeti	c, logical	, relational an	d terna	ry opei	ators.							
	Write a C program to demonstrate the usage of conditional statements for the following:         1.       Print the multiples of 5 and multiples of 10 in the range of 1 to n.         2.       To print the grade for given mark as per the details below         Mark         Grade														
	Mark Grade														
	>=90 A														
4.	81<=Mark<90 B 71Mark<80 C														
	71<=Mark<80 C														
	61<=Mark<=70 D														
		-50	RA												
5.	Write a C	F program to demonstrate the 1. Print the month nam 2. Implementation of sint the looping constructs for the	switch construct for the followir e for the given number mple calculator ne following:	ng:											
6.		<ol> <li>Print all the factors of</li> <li>Count the number of</li> </ol>	f a given number digits in a given number												
7.	Demonst	rate call by value and call by	reference using functions.												
8.	Develop	a code to implement recursion 1. GCD of two numbers 2. Factorial	n for the following: s												
9.	Write a C	<ul> <li>program for the following:</li> <li>1. Find the sum of elen</li> <li>2. Print the addition of 3. Print the multiplication</li> </ul>	nents in an array using a functic two matrix using 2D array on of two matrix using 2D array	on											
10.	Create a	2D character array to store th	e names of students in a class	and print	the length of	each.									
	1				-			Total:60							
REFE	RENCES/ N	IANUAL /SOFTWARE:													
1.	Laboratory Manual														
COUR On co	SE OUTCO	DMES: f the course, the students v	vill be able to			(۲	BT Ma lighest	pped Level)							
CO1	design ar	algorithm and flowchart for a	a given problem			ŀ	Applying mitatio	g(K3), n(S1)							
CO2	2 apply conditional statements and iterative statements in solving real world problems Applying(K3), Precision(S3)														
CO3	construct	programs using functions, ar	rays and strings			/ Ma	Applyin anipula	g(K3), tion(S2)							



	Mapping of Cos with POs and PSOs														
COs/POs	COs/POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02														
CO1	3	2	1	1									2	3	
CO2	CO2         3         2         1         1         2         3														
CO3	CO3         3         2         1         1         2         3														
1 – Slight, 2	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														

	22BCL13 - WEB PROGRAMMING LABORATORY														
	(	Commo	on to Co	mputer	System	ns and I	Design,	Informa	ation Sy	vstems &	Software S	ystem	s)		
Programm Branch	e &	B.Sc Syste	& Com ems, Sc	puter S oftware	Systems Systen	s and D ns	esign,	Informa	ation	Sem.	Category	L	Т	Р	Credit
Prerequisi	tes	Nil								1	PC	0	0	4	2
Preamble		To pr web a	ovide kr applicati	nowledg ions usi	ge in the ng clien	e core c t-side a	oncepts and serv	of web er-side	design scriptin	ing for d ig with M	eveloping s lySQL datat	tatic a base c	s well onnec	as dy ction	namic
LIST OF E	XPERI	IENTS	/ EXER	CISES:											
1.	Devel	op a sta	atic web	page fo	or your	college	using H	ITML							
2.	Desig	n a web	ρage ι	using ta	ble form	natting a	and ima	ges							
3.	Devel	op a we	eb page	using f	orm cor	ntrol ele	ments								
4.	Desig	Design a dynamic web page using inline, internal and external cascading style sheets													
5.	Const	Construct a multicolumn layout web page using CSS with a responsive design													
6.	Write	Write a javascript to validate a webpage													
7.	Using occur	Using DOM, add various elements and change the attributes of the web page dynamically when mouse event occurs.													
8.	Write	Write a PHP program using arrays and user-defined functions													
9.	Devel	op SQL	querie	s to mai	nipulate	a simp	le table	in MyS	ql						
10.	Write	a PHP	code wi	th Myso	ql conne	ectivity f	or ticke	t reserv	ation sy	/stem					
															Total:60
REFEREN	CES/ M	ANUAL	/SOFT	WARE	:										
1.	Lab M	lanual													
COURSE	оото	MES:					•					B	T Ma	oped	
On comple	etion of	the co	urse, tr	ne stud	ents wi	ll be at	ole to					(Hiệ Ar	<b>Jnest</b>		1)
CO1	demo	nstrate	the usa	ge of ba	asic HT	ML tags	s, tables	, frame	s and fo	orms		Man	ipulati	ion (S	2)
CO2	imple	ment ca	iscading	g style s	heets a	nd java	script c	oncepts	;			Ap Man	plying	g (K3) ion (S	2)
CO3	manip	ulate th	ne data	base wi	th PHP	to deve	elop a si	mple re	al time	applicati	on	Ap	plying	g (K3)	<u>-</u> )
	Precision (S3)														
00-/00	DO1	DOO	DOA	DC 4	марр	ing of	Los wit		and PS			DOA		004	DOOD
CUS/PUS	101	P02	P03	P04	P05	P06	P07	804	P09	P010	P011	P01	2   P	501	P502
CO1	3	2	1	1									_	2	3
CO2	3 2	2	1	1										2	3
1 – Slight, 2	3         2         1         1         2         3           ight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy         2         3														

22BCC21 - COMMUNICATIVE ENGLISH II												
		(Common to Computer Systems and Design, Information System	ns & Sof	tware System	ns)			1				
Progran Branch	mme&	B.Sc& Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	Т	Ρ	Credit				
Prerequ	uisites	Nil	2	HS	3	0	2	4				
Preamb	le	To construct sentences effectively and facilitate to improve interp provide good exposure in the field of communication.	personal	skills of the l	earn	ers.	lt can	also				
Unit – I	, types of a	Grammar and Vocabulary:	and Day	sitivo Nogativ	~	Poor	lina:	<b>9</b>				
Image: Types of sentences - Assentive, imperative, interrogative and Exclamatory and Positive, Negative - Reading. Passages         focusing on factual details, and features of text organization as well as gist, opinions and attitudes - Writing: Letter Writing: inviting         guests, Job application with resume, seeking permission for Industrial Visit. Activities: Listening: Social Conversations - Speaking:         Technical Presentation         Unit – II       Grammar and Vocabulary:         9         Homonyms and homophones - Subject-verb agreement - Reading: Gapped-text exercises - Writing: Transcoding - Preparing         proposals - Activities: Listening: Telephone conversations - Speaking: Role Play												
proposals - Activities: Listening: Telephone conversations - Speaking: Role Play												
Unit – I	<b>II</b>	Grammar and Vocabulary:						9				
Articles Designii	Articles and determiners - Simple, compound and complex - Reading: Multiple matching - Writing: Checklist – Memorandum – Designing brochures. Activities: Listening: Telephonic conversation - Mock Group Discussions - Speaking: Group Discussion											
Unit – ľ	V	Grammar and Vocabulary:						9				
Error de Activitie	etection – Ge s: Listening:	Motivational Talks - Speaking: Speaking with native accent.	type exe	ercises - Writi	ing: I	Reco	mme	ndations -				
Unit – V	1	Grammar and Vocabulary:						9				
Single v Languag TED Ta	vord substitu ge Testing S Iks - Speakir	tion - Definitions – Purpose and function – Interpreting news / ad System (IELTS) type exercises - Writing: Report Writing: special ng: Mock Interviews.	dvertiser and teo	ment - Readi chnical repor	ng: l ts - /	ntern Activi	ation ties:	al English Listening:				
LIST OF	FEXPERIM	ENTS / EXERCISES:										
1.	Mock Interv	iew										
2.	Job Applica	tion with resume										
3.	Making a pi	resentation on a technical topic/case study										
4.	Group Disc	ussion										
5.	Reading Ale	bud										
6.	Listening to	native speakers' talks and imitating them										
7.	Writing abo	ut a social issue										
8.	Writing for b	ologs/social media										
9.	Writing corr	npany profiles										
10.	Pronunciati	on test										
				Lecture:45	5, Pra	actic	al:30	, Total:75				
TEXT B	OOK:											
1.	Sanjay Kum	nar and PushpLata, "Communication Skills", 2nd Edition, New Delh	ni: Oxfor	d University F	Press	, 201	5.					
REFER	ENCES/ MA	NUAL / SOFTWARE:										
1.	Raymond M Cambridge:	Iurphy, "Essential English Grammar: Reference and Practice for S Cambridge University Press, 2012.	outh Asi	an Students"	, 2nc	Edit	ion,					
2.	GiennisPye	, vocabulary in Practice, Parts 1 and 21, 1st Edition, Cambridge: (	Jamprid	ge University	Pres	ss, 20	JTT.					
3.	Tense bust	er, DVD, podcasts, Authentic Videos, and Laboratory Manual										

COUR	SE OUTCOMES,	PT Monnod
On col	npletion of the course, the students will be able to	(Highest Level)
CO1	use structural words appropriately in spoken and written texts	Remembering (K1)
CO2	construct different types of sentences	Applying (K3)
CO3	read longer academic and business English texts with maximum understanding	Understanding (K2)
CO4	write beyond the sentence level	Applying (K3)
CO5	communicate effectively in a vast range of personal, professional, academic, and cultural situations	Applying (K3)
CO6	understand the pronunciation of the native speakers (English) about their real time experience after listening to the videos	Understanding (K2), Manipulation (S2)
C07	write coherently without grammatical errors.	Creating (K6), Precision (S3)
CO8	take part in Group Discussion, Paper or project presentation and mock interview	Analyzing (K4), Manipulation (S2)

				Ν	lapping	of COs	with P	Os and	PSOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				1		2		1	2	3		3	1	1
CO2				1		2		1	2	3		3	1	1
CO3				1		2		1	3	3		3	1	1
CO4				1		2		1	3	3		3	1	1
CO5				1		2		1	3	3		3	1	1
CO6				1		2		1	2	3		3	1	1
CO7				1		2		1	2	3		3	1	1
CO8				1		2		1	2	3		3	1	1

	ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	10	10	40	10	-	30	100						
CAT2	10	10	50	-	-	30	100						
CAT3	10	10	50	-	-	30	100						
ESE	10	10	40	10	-	30	100						
* ±3% may be varied (C	CAT 1,2,3 – 50 marks	& ESE – 100 mark	s)										

22BCC22 - MATHEMATICS II														
		(Common to Computer Systems and Design, Information Syste	ems & So	oftware Syster	ns)		-	1						
Progra Branch	imme& າ	B.Sc& Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	Т	Ρ	Credit						
Prereq	uisites	Nil	2	BS	3	1*	2*	4						
Preaml	ole	To introductory course which inculcates the knowledge of Probal business and also it gives adequate exposure in the basic conce	bility, Sta pts of te	atistics and its st of hypothes	app sis a	lication Id co	on in t ntrol c	he field of charts.						
Unit –	Unit – I Probability: 9+3 Pasic Terminology - Mathematical Probability - Avignatic Approach to Probability - Addition Theorem on Probability - Condition													
Basic Probab	Basic Terminology - Mathematical Probability - Axiomatic Approach to Probability - Addition Theorem on Probability - Conditional Probability - Multiplication Theorem on Probability - Independence of Events - Total Probability - Baye's Theorem.													
Unit – Measu	Unit – II         Statistical Measures:         9+3           Measures of central tendency: Mean Median Mode Measures of dispersion: Range - Quartile deviation - Mean deviation         Standard													
deviatio	weasures of central tendency: Mean, Median, Mode. Measures of dispersion: Range - Quartile deviation - Mean deviation - Standard deviation.													
Unit –	Unit – III Correlation and Linear Regression: 9+3													
Karl Pe	Pearson's Coefficient of Correlation - Rank Correlation -Spearman's Rank Correlation Coefficient - Repeated Ranks - Regression													
Unit –	e of Y on X - Regression Line of X on Y. it – IV Test of Significance for Small Samples: 9+3													
Introdu mean a - Chi-se	roduction to sampling distributions - Types of sampling - Standard Error - Student's t-test: Test of significance between the sample an and population mean – Test for difference between two sample means - F-test for difference between two population variances chi-square Test for Goodness of Fit - Chi-square Test for Independence of Attributes.													
Unit –	V Charta Car	Statistical Quality Control:	ottributor	v a Chart a C	hor	and	nn ok	9+3						
Control	Charls - Cor		allindules	s. 0-01an, p-0	nan	anu	np- cr	iait.						
LIST O	FEXPERIME	INTS / EXERCISES:												
1.	Determination	on of the probability												
2.	Compute the	e measures of central tendency and dispersion												
3.	Determine t	he correlation coefficients and covariance												
4.	Compute the	e linear regression lines for the given data												
5.	Testing sign	ificance of means using student's t-test												
6.	Testing the	independence of attributes using Chi-square test												
7.	Plot a contro	bl chart for variables												
8.	Plot a contro	ol chart for attributes												
*Alterna	ate week	1	Lecture:	45, Tutorial a	nd	Pract	ical:1	5, Total:60						
TEXT E	BOOK:													
1.	Veerarajan McGraw-Hill	T, "Probability and Statistics, Random process with Queueing Education (India), New Delhi, 2017 for Unit I, III, IV, V.	Theory	and Queuei	ng l	Vetwo	orks",	4thEdition,						
2.	S C Gupta Publishers,	& V K Kapoor, "Fundamental of Mathematical Statistics", 12th New Delhi, 2022 for Unit II.	Edition,	Sultan Char	nd a	nd So	ons, E	Educational						
REFER	RENCES/ MA	NUAL / SOFTWARE:												
1.	. Kandasamy P, Thilagavathy K, Gunavathy K, "Probability Statistics and Queueing Theory", S. Chand& Co, New Delhi, 2016.													
2.	Douglas C. 2020.	Montgomery, George C. Runger, "Applied Statistics and Probabilit	y for Eng	gineers" - 6th	Editi	on, N	ew De	elhi Wiley,						
3.	MATLAB Ma	anual.												

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	make use of the concept of probability to real life scenarios	Applying (K3
CO2	determine the mean, median and mode for ungrouped and grouped data	Applying (K3)
CO3	identify the relation between two variables understand the concepts of two-dimensional regression	Applying (K3
CO4	apply statistical tests for solving problems involving small sample tests	Applying (K3)
CO5	prepare control charts to monitor the production process	Applying (K3)
CO6	know the basis of descriptive statistics and visualization, dispersion standard deviation, variance and compute the correlation coefficients and covariance, test whether the given data is significant by hypothesis testing and obtain the control chart for variables and attributes using MATLAB.	Understanding (K2) Manipulation(S2)

	Mapping of COs with POs and PSOs													
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3												
CO2	3	3												
CO3	3	2	2										1	
CO4	3	2	3										2	
CO5	3	2	3										2	
CO6					3									
1 – Slight, 2	I – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

	ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	10	20	70				100						
CAT2	10	20	65				100						
CAT3	10	30	60				100						
ESE	10	25	65				100						
* ±3% may be varied (0	* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

22BCT21 - ADVANCED C PROGRAMMING												
	(Common to Computer Systems and Design, Information Sy	stems & S	Software System	ems	)							
Programme Branch	& B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Р	Credit					
Prerequisit	Problem Solving and Programming in C	2	PC	3	0	0	3					
Preamble	This course provides an introduction to the advanced feature applications of linear data structures like stack and queue.	s of C lan	guage, basic	conc	epts	and						
Unit – I User Defined Data types:												
Structures: Introduction – Declaration – typedef –Initialization – Accessing the members – Copying and Comparing structures – Nested Structures – Arrays of Structures – Structures and Functions - Self-referential Structures. Union: Declaration – Accessing the members – Initialization. Enumerated Data Types.												
Unit – II	Pointers to Arrays & Strings:						9					
Introduction – Pointers &	Introduction to Pointer –Declaration – Expressions & Arithmetic – Types of pointers – Pointers and Arrays – Array Name & Pointer – Pointers & Strings – Arrays of pointers – Pointers and 2D arrays – Pointers and 3D arrays.											
Unit – III	Pointers and Functions:						9					
Passing arg passing a F Memory Alle	uments to function using Pointers – Function Pointers: Initialization – unction Pointer to Function-Array of Function Pointers- Pointers to Po cation- Drawbacks of Pointers.	Function inters- Me	Call – Comp emory allocati	aring on a	g Fur nd U	nction sage	Pointers – – Dynamic					
Unit – IV	Files:						9					
Introduction commandLi	to Files - Using Files in C – Read data from Files - Writing data to Files te arguments – Functions for a selecting a record randomly – remove(	s - Detecti ) – Renan	ing End-of-File	es g Fi	Acce les.	pting						
Unit – V	Stack & Queue:						9					
Stack: Intro Operations	uction – Array representation – Operations on Stacks – Applications o on Queues - Applications of Queues.	f Stacks-	Queues – Arr	ay re	epres	entati	on —					
							Total:45					
TEXT BOO	<:											
1. Ree	ma Thareja, "Programming in C", 2nd Edition, Oxford University Press	, New De	lhi, 2020.									
REFERENCES:												
1. Y	shavant Kanetkar,"Let us C", 16th Edition, BPB Publications, 2018.											
2. Balagurusamy E., "Programming in ANSI C", 7th Edition, Mc Graw Hill Education, 2017.												

COUR On cor	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	implement structure, union and enum for handling values of different data types	Applying (K3)
CO2	write C program using pointers for accessing arrays and strings	Applying (K3)
CO3	develop C program using pointers to access functions	Applying (K3)
CO4	implement file operations like create, store and retrieve data from files	Understanding (K2)
CO5	illustrate the operations on stack & queue and their usage	Understanding (K2)

	Mapping of COs with POs and PSOs													
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1					2	3	3	2	2	3
CO2	3	2	1	1					2	3	3	2	2	3
CO3	3	2	1	1					2	3	3	2	2	3
CO4	2	1											1	2
CO5	2	1											1	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's T	axonomy

ASSESSMENT PATTERN - THEORY														
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	10	40	50				100							
CAT2	35	40	25				100							
CAT3	40	50	10				100							
ESE	20	35	45				100							
* ±3% may be varied (0	CAT 1,2,3 – 50 mark	s & ESE – 100 mai	rks)											

		22BCT22 - JAVA PROGRAMMING	3												
	(Common to Computer Systems and Design, Information Systems & Software Systems)  Programme & B.Sc & Computer Systems and Design, Information														
Progra Branci	imme & h	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Р	Credit							
Prerec	uisites	Nil	2	PC	3	0	0	3							
Pream	Preamble This course introduces the fundamentals of object-oriented features using java programming. It also emphasizes on developing java programs using packages, multithreading, exception handling and streams.														
Unit –	Unit – I Introduction: 9														
Java E Java P Virtual	Java Evolution: Java History - Features - Java and WWW - Web Browsers - Overview of Java Language: Simple Java Program - Java Program Structure - Java Tokens - Java Statements - Installing and Configuring Java - Implementing a Java Program - Java Virtual Machine - Command Line Arguments - Constants, Variables and Data Types.														
Unit –		Operators and Expressions, Decision Making Statements	, Classes	s and Object	s:			9							
Operat Introdu Method	Operators and Expressions - Decision Making and Branching - Decision Making and Looping - Classes, Objects and Methods: Introduction to Class - Defining a Class - Methods Declaration - Creating Objects - Accessing Class Members - Constructors - Method Overloading - Static Members - Nesting of Methods - Inheritance - Overriding methods.														
Unit –		Arrays, Strings, Vectors and Interfaces:						9							
One Di Interfac	mensional A ces - Extendi	rray - Creating an Array - Two Dimensional Arrays – Strings – V ng Interfaces - Implementing Interfaces - Accessing Interface Va	ectors – <sup>V</sup> ariables.	Wrapper Clas	ses	- Inte	rfaces	s: Defining							
Unit –	IV	Packages and Multithreaded Programming:						9							
Packag Using a Threac Interfac	ges: Java AP a Package - <i>I</i> I Class - Stop ce.	I Packages - Using System Packages - Naming Conventions - C Adding a Class to a Package - Hiding Classes - Multithreaded P oping and Blocking a Thread - Life Cycle of a Thread - Using Thr	Creating F rogramm read Meth	Packages - Ad ing: Creating hods - Implen	cces: Thre nenti	sing a ads - ng th	a Pacł · Exter e Run	kage - nding the nable							
Unit –	V	Exceptions, Managing I/O files, Collections:						9							
Manag Using I Stream bytes -	ing Errors an Finally Stater is - Other use Java Collect	d Exceptions: Types of Errors - Exceptions - Syntax of Exceptio nent - Managing I/O files: Concept of Streams – Stream classes eful I/O Classes – Using the File Classes – Creation of Files – R ions: Overview of Interfaces – Overview of classes: ArrayList – I	n Handlir – Byte S eading /V Hashtable	ng Code - Mu stream – Char Vriting Charac e.	ltiple acte cters	Cato r stre - Re	h Sta am - I ading	tements - Using /Writing							
								Total:45							
TEXT	BOOK:														
1.	1. Balagurusamy E., "Programming with Java", 6th Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2019.														
REFER	REFERENCES:														
1.	Schildt Her	bert, "Java: The Complete Reference", 11th Edition, McGraw Hi	ill Educat	ion, New Dell	ni, 20	)18.									
2.	Paul Deitel	, Harvey Deitel., "Java How to Program",11th Edition, Pearson E	Educatior	n,2018.											

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	explain the basics of Java and object-oriented programming	Understanding (K2)
CO2	solve the real time problems using classes and objects	Applying (K3)
CO3	apply the concepts of arrays, strings, vectors and interfaces	Applying (K3)
CO4	apply multithreading concepts and create user defined packages	Applying (K3)
CO5	implement exception handling techniques and I/O streams	Applying (K3)

Mapping of COs with POs and PSOs														
COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1											2	3
CO2	CO2         3         2         1         1										2	3		
CO3	3	2	1	1									2	3
CO4	3	2	1	1									2	3
CO5	3	2	1	1									2	3
1 – Slight, 2	- Mode	erate, 3 –	Substanti	al, BT-	Bloom's <sup>·</sup>	Taxonor	ny							
					ASSES	SMENT	PATTE	ERN – <sup>·</sup>	THEOR	Y				
Test / Bl Categ	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)	anding %	Apply (K3)	ying %	Analyzi (K4) 9	ng l %	Evaluating (K5) %	) C	reating (K6) %	Total %
CAT	CAT1 10 50 40 100													

	-	-		-							
	CAT2	10	40	50	-	-	-	100			
	CAT3	10	40	50	-	-	-	100			
	ESE	10	40	50	-	-	-	100			
* ±3% may be varied (CAT 1.2.3 – 50 marks & ESE – 100 marks)											

					2	2BCT	T23 -	- OPI	ERA		G SY	'STEI	MS									
		(C	ommon to (	Compute	er Sys	stems	s and	d Des	sign,	, Info	rmati	ion S	yste	ms & \$	Soft	ware	Syste	ems)				
Progra Branci	amme & h	B.S Sy	Sc & Comp stems, Sof	uter Sy tware S	/stem: Systen	s and ms	d Des	sign,	n, Inf	form	atior	۱		Sem.	C	Categ	gory	L	т	Ρ	С	redit
Prerec	uisites	Nil												2		B	S	3	0	0		3
Pream	ble	То	impart the	role of c	operati	ing sy	ystem	m in r	man	nagir	g the	proc	ess,	mem	ory a	and s	storag	e. It	also f	focus	es or	1
process synchronization, deadlocks and disk scheduling algorithms.																						
Unit –		Ov	erview of (	Operati	ng Sy	vstem	n and	d Sys	stem	n Ca	lls:											9
Introduction: Role of Operating System – Operating System Operations – Resource Management – Virtualization – Cor Environments – Operating System Structures: Operating System Services – System Calls – Types of System Calls – Build Booting an Operating System.															Con Buildi	nputing ng and						
Unit –	II	Pro	ocess Man	agemei	nt:																	9
Proces Multico	s: Process Corre Programm	Conce ming -	ept – Proces - Multithrea	s Sche ding Mo	duling odels -	ј — Ор – СРІ	perati U Scł	tion o chedu	on Pi uling	Proce g: Ba	sses sic C	– Inte once	er Pi pts -	rocess - Sche	Co duli	mmu ng C	inicati riteria	on – –Sc	Thre hedu	ads: ( ling A	Over Igori	view – thms.
Unit –	111	Pre	ocess Syn	hroniz	ation:	:																9
Synchi Synchi Deadlo Avoida	ronization Toc ronization Exa ock: System M .nce – Deadlo	ools: E xampl Mode lock D	Background es: Classic I – Deadloc Detection – I	<ul> <li>Critic</li> <li>Problen</li> <li>k Chara</li> <li>Recover</li> </ul>	al Sec ns of S acterizary ry from	ction F Synch ation n Dea	Probl hroniz n – Me adlocl	olem - izatio lethoo ck.	– Pe on – ods fo	eters The or ha	on`s Bour andlin	Solut nded ng De	tion - Buff adlo	– Mute er Pro ck – D	ex lo bler lead	icks - n – T llock	- Sem The Re Preve	naph eade entio	ores - rs Wi n – D	- riters eadlo	Prob ock	lem.
Unit –	IV	Me	emory Man	agemer	nt:																	9
Main M Backgi	lemory: Back ound – Dema	kgrou nand F	nd – Contig Paging – Co	luous M py on V	lemory Vrite –	y Allo - Pag	ocatio ge Re	on – F eplac	Pagi ceme	ing - ent: I	- Stru FIFO	icture – LR	e of F U –	Page T Optim	able al.	ə — S	wapp	ing -	- Virtu	ual Me	emor	y:
Unit –	V	Sto	orage Mana	agemer	nt and	I File	Syst	tem:														9
Mass S – File S Free sj	Storage Struc System Imple bace Manage	icture: emen jemen	Overview - tation: File : t.	- HDD S System	Schedu Struct	uling ture –	– File – File	le Sys e Sys	/sten stem	m Int n Ope	erfac ∍ratio	e: File	e co Dire	ncept ctory I	– Ao mpl	emei	s Metl ntatio	nods n – A	– Dir Iloca	rector tion M	y Str letho	ucture ods –
																					Т	otal:45
TEXT	BOOK:																					
1.	Silberschatz New Delhi,	atz Abi i, 2018	raham., Gal 3.	vin B Po	eter ar	nd Ga	agne	Gre	∋g, "(	Oper	ating	l Syst	em	Conce	pts"	, 10t	h Edit	ion, '	Wiley	' India	ı Pvt.	Ltd.,
REFE	RENCES:																					
1.	Manish Kun Approach" <i>1</i>	umar S ' 1st E	Singh,Sachi dition ,Cen	n Kuma gage Le	ır,Saib earning	oal Ku g India	umar ia Priv	<sup>.</sup> Pal," ivate	," Op e Lim	perat nited	ing S , 202	systen 2.	ns: (	Conce	pt B	uildir	ng & F	robl	em S	olving	J	
2.	William Stal	allings	s, "Operatin	g Syste	ms Int	ternal	ls and	ıd De	esign	n Pri	nciple	es", 9	th E	dition,	Pre	ntice	Hall,	2018	3.			
3.	Remzi H Ar Independen	Arpaci ent Pu	Dusseau , . blishing Pla	Andrea tform, 2	C Arp 2018.	aci D	Dusse	eau ,	, "Ор	perat	ing S	syster	ns: 1	Three	Eas	y Pie	ces",	1st E	Editio	n, Cre	eate	Space

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	explain the role and types of operating systems	Understanding (K2)
CO2	implement various process scheduling algorithms	Applying(K3)
CO3	demonstrate different process synchronization solutions and deadlock management	Applying(K3)
CO4	apply the page replacement algorithms for memory management	Applying (K3)
CO5	make use of disk scheduling algorithms in secondary storage management	Applying(K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1											2	3
CO2	3	2	1	1									2	3
CO3	3	2	1	1									2	3
CO4	3	2	1	1	1								2	3
CO5	3	2	1	1	1								2	3
1 – Slight, 2	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

ASSESSMENT PATTERN - THEORY														
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	20	50	30				100							
CAT2	20	45	35				100							
CAT3	20	40	40				100							
ESE	20	40	40				100							
* + 2% may be varied ((	NT 1 2 2 50 mark	2 8 ESE 100 may	rkc)											

\*  $\pm$ 3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

22BCL21 - ADVANCED C PROGRAMMING LABORATORY																
	(Common to Computer Systems and Design, Information Systems & Software Systems)															
Progra Branci	amme h	&	B.Sc Syste	& Com ems, So	puter S oftware	ystems Systen	and D	esign, I	Informa	ition	Sem.	Category	L	т	Ρ	Credit
Prereq	luisite	es	Prob	em Sol	ving ar	nd Prog	rammi	ng in C			2	PC	0	0	4	2
Pream	ble		To stu	udy and	implem	ent the	advanc	ced feat	ures of	C progr	amming	and basics	of data	a stru	uctures	3.
LIST O	F EX	PERIN	IENTS	/ EXER	CISES:											
1.	Crea	ate a s	structure	to impl	ement t	he banl	king app	plicatior	to store	e and re	etrieve c	ustomer det	ail.			
2.	Write	e a pro	ogram t	o demo	nstrate	the usa	ge of er	numerat	ed data	type.						
3.	Develop a code to find the largest element in every row of a matrix by passing it to a function using a pointer.															
4.	Develop a code to print the strings containing vowels in a 2D character array by passing it to a function using a pointer.															
5.	Implement a function pointer to a function that finds the length of a string.															
6.	Write a program to illustrate the dynamic memory allocation.															
7.	Write a program in C to create and store information in a text file.															
8.	Write a program in C to merge two files and write it in a new file.															
9.	Imp	lemen	tation o	f Stack	operatio	ons.										
10.	Imp	lemen	tation o	f Queue	Opera	tions.										
															-	Fotal:60
REFER	RENCI	ES/ M	ANUAL	/SOFT	WARE:											
1.	Labo	oratory	/ Manua	al												
COUR	SE OL	JTCO	MES:					1- 1-					BT N	lapp	bed	
On cor	mpieti	ion of	the co	urse, th	e stude	ents wil	i be ab	ie to				(	Apply	ina()	K3)	
CO1	impl	ement	t the stru	ucture, I	union, e	num da	ta struc	ctures.					Imita	tion(	S1)	
CO2	use	pointe	ers in ha	ndling a	arrays, s	strings, f	function	ns and fi	les.				Apply Precis	ring(l sion(	K3), (S3)	
CO3	code	e the c	peratio	ns of sta	ack and	queue.						N	Apply Ianipu	ring(l Ilatio	K3), n(S2)	
						Маррі	ing of C	Cos wit	h POs a	and PS	Os					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	P012	2 F	PSO1	PSO2
CO1	CO1 3 2 1 1 2 3															
CO2	CO2         3         2         1         1         2         3															
CO3	3	3	2	1	1										2	3
1 – Slic	aht. 2 -	– Mod	erate. 3	- Subs	tantial.	BT- Blo	om's Ta	xonom	/							

	22BCL22 - JAVA PROGRAMMING LABORATORY															
	(Common to Computer Systems and Design, Information Systems & Software Systems)  Programme & B Sc & Computer Systems and Design Information															
Progra Branci	amme h	&	B.Sc Syste	& Com ms, So	outer S ftware	ystems System	and De s	esign, l	nforma	tion	Sem.	Category	L	т	Ρ	Credit
Prereq	luisite	s	Nil								2	PC	0	0	4	2
Pream	ble		This c Java p	ourse p program	rovides iming.	knowle	dge in t	he core	concep	ots and i	impleme	ntation of ol	oject-	orie	nted fe	atures in
LIST C	F EXF	PERIM	IENTS /	EXER	CISES:											
1.	Imple	ement	ation of	comma	nd line	argume	nts in J	ava.								
2.	Imple	ement	the cor	icepts o	f classe	s and o	bjects									
3.	Write	e a jav	a progra	am to in	nplemer	nt overlo	bading a	and con	structor	s.						
4.	Implementation of inheritance and method overriding.															
5.	Implementation of multiple inheritances using interface.															
6.	Create and import a user defined package.															
7.	Imple	ement	ation of	multithr	eading	concep	t.									
8.	Imple	ement	ation of	excepti	on hand	lling me	chanisr	ms.								
9.	Perf	orm re	ad and	write op	eration	s in a te	xt file.									
10.	Write	e a jav	a progra	am to in	nplemer	nt collec	tions.									
																Total:60
REFE	RENC	ES/ M/	ANUAL	/SOFT	WARE:											
1.	Labo	oratory	Manua													
COUR	SE OL	JTCOI	MES:											E	BT Map	ped
On co	mpleti	ion of	the cou	urse, th	e stude	nts wil	l be abl	e to						(Hi	ghest	Level)
CO1	den	nonstra	ate cons	structors	s and m	ethod o	verload	ling usin	g class	es and	objects			A Ma	pplying nipulati	(K3), on(S2)
CO2	imp	lemen	t inherit	ance ar	nd packa	ages for	an app	lication						A P	pplying recisio	l(K3), h(S3)
CO3	exp	erimer	nt with r	nultithre	ading, e	exceptio	on hand	ling me	chanism	n and co	ollections	6.		A P	pplying recisio	(K3), n(S3)
						Mappi	ng of C	os with	POs a	nd PSC	Ds					
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P01	2	PSO1	PSO2
CO1	1	2	1												2	3
CO2	2	3	2	1	1										2	3
COS	CO3     3     2     1     1     2     3															
1 – Slig	ght, 2 -	– Mode	erate, 3	- Subst	antial, E	BT- Bloc	om's Tax	xonomy	I	I	I			1		

	22BCL23 - OPERATING SYSTEMS LABORATORY															
	(	Commo	on to Co	mputer	System	ns and I	Design,	Informa	ation Sy	stems &	Software S	Syster	ms)			
Programm Branch	е&	B.So Syst	c & Con tems, S	nputer oftwar	Systen e Syste	ns and ms	Design	, Inforn	nation	Sem.	Catego	ory	L	т	Ρ	Credit
Prerequisi	tes	Nil								2	BS		0	0	4	2
Preamble		This sche	course eduling	empha problem	isis on l ns, file a	Jnix cor Ind proc	mmands cess cor	s and C	prograr erations	nming fo	r the imple	ement	atior	n of d	disk	
LIST OF E	<b>XPERIN</b>	IENTS	/ EXER	CISES												
1.	Execu enviro	ite the b nment	basic Ur	nix com	mands,	directo	ry / File	comma	ands and	d File pei	rmission co	omma	ands	in U	NIX	
2.	Exect	ute the	comma	nds rela	ated to \$	Standar	d I/O, R	edirecti	ion Pipe	s and Fil	ters in Uni	х				
3.	Exect	ute the	comma	nds rela	ated to r	egular	express	ions an	d disk n	nanagem	ent in Uni	x				
4.	Execute the commands related to process creation in Unix environment															
5.	Write a shell script program using shell variables, branching and looping control structures															
6.	Write a shell script that accepts the filename as its argument and search for a given word in the file															
7.	Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it															
8.	Write the C program to Implement producer consumer problem															
9.	Implementation of SJF scheduling															
10.	Imple	mentat	ion of F	IFO pag	ge repla	cement	t algoritl	nm								
					-										٦	Fotal:60
REFEREN	CES/ M	ANUAL	/SOFT	WARE	:											
1.	Lab M	lanual/	Linux O	S/Web	minal											
COURSE C	OUTCO	MES:												вт	Мар	ped
On comple	tion of	the co	urse, th	ne stud	ents wi	ll be at	ole to						(	High	est l	_evel)
CO1	demo	onstrate	various	s Unix c	commar	nds rela	ted to fi	le and p	orocess	manager	ment			App Imit	lying ation	(K3), (S1)
CO2	demo	onstrate	inter pi	rocess	commui	nication	with th	e syster	m calls				N	App Ianip	lying	(K3), on(S2)
CO3	perform scheduling and synchronization problems     Applying(K3), Manipulation (S2)															
Mapping of Cos with POs and PSOs																
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO	12	PS	01	PSO2
CO1	3	2	1	1										2	2	3
CO2	3	2	1	1										2	2	3
CO3	3	2	1	1										2	2	3
1 – Slight, 2	2 – Mod	erate, 3	– Subs	stantial.	BT- Blo	om's Ta	axonom	y								

	22BCT31 - PYTHON PROGRAMMING									
(Common to Computer Systems and Design, Information Systems & Software Systems)										
Progra Branc	amme & h	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Р	Credit		
Prerec	uisites	Nil	3	PC	3	0	0	3		
				L			1	1		
Pream	Preamble This course introduces the core python programming. It emphasizes on developing python programs with various data types, functions, modules, classes and objects									
Unit –	I	Problem Solving Strategies and Basics of Python Program	nming:					9		
Proble Literals Expres Break,	m Solving Sta s – Variables sions – Decis Continue and	rategies – Program Design Tools – Types of Errors – Testing and Identifiers – Data Types - Input Operation – Comments - sion Control Statements: Introduction – Conditional Branching S Pass statements – Else in Loops.	and Del - Reserv tatemen	ougging- Bas ed Words – t – Iterative S	ics c Inder Stater	of Pyth ntation nents	on Pro – Ope – Nest	ogramming: erators and ed Loops –		
Unit –	II	Functions and Modules:						9		
Functio Lambd Module	Functions and Modules: Introduction - Definition – Call – Variable Scope and Lifetime – The return Statement – Function Arguments – Lambda Function – Documentation Strings – Programming Practices - Recursive Functions -Modules – Packages – Standard Library Modules- Globals(), Locals() and Reload() – Function Redefinition.									
Unit – III Python String: 9										
Introdu Method – String	iction -Concat ds and Functi g Module – R	tenation, Append, Multiply on Strings – Strings are Immutable – ons – Slice Operation – ord() and chr() functions – in and not in egular Expressions – match(), search(), sub(), findall() and findit	String Fo Operato ter () Fur	ormatting Ope rs – Compari nctions – Flag	erato ng St j Opt	r – Bu rings - ions.	ilt-in St - Iterat	tring ing String		
Unit –	IV	Data Structures:						9		
Lists- A Loopin Return Create Method	Access Value g in Lists - Tu ing multiple v - Access - Ao ds – List vs Tu	es - Update Values - Nested list - Cloning List - Basic List Op uple - Create - Utility - Access Values - Update - Delete Elemen alues - Nested tuples - Checking the Index - Count the Element dd and Modify an Item - Delete an Item - Sorting Item - Looping uple vs Dictionary.	berations hts -Basi s –Sets - Over - N	- List Metho c Tuple Oper - Creation- S lested Diction	ods - ation et op ary -	List C s - Tuj eratior Built-i	Compre ple Ase ns - Die n Fund	ehensions - signments - ctionary - ctions and		
Unit –	V	Introduction to OOP:						9		
Classe Destru Polymo	s and Objec ctor – Public orphism and N	ts: Classes and Objects – Class Method and self Argument and Private Data Members – Private Methods – Class Met Method Overriding - Types of Inheritance — Containership – Ab	t – Cons hod – S stract cla	structor – Cla tatic Method asses and Inte	ass a - In erfac	and O heritar es - M	bject hce:Int etaclas	Variables – roduction – ss.		
Total:45										
ТЕХТ ВООК:										
1. Reema Thareja, "Python Programming Using Problem Solving Approach", 3rd Edition, Oxford University Press, New Delhi, 2020.										
REFER	RENCES:									
1.	Nageswara	Rao, "Core Python Programming", 2nd Edition, DreamTech Pre	ess, New	Delhi, 2018						
2.	2. Timothy A. Budd, "Exploring Python", Paperback, McGraw Hill Education India Pvt Ltd., 2017.									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	understand the problem solving strategies and basic building blocks of python	Understanding (K2)
CO2	solve the problems using functions and modules	Applying (K3)
CO3	apply strings and regular expression for searching in a string	Applying (K3)
CO4	apply list, tuple and dictionary to handle variety of data	Applying (K3)
CO5	understand the class and object and apply inheritance in programming	Applying (K3)

Manning	of	COs	with	POs	and	PSOs
mapping	v	003	WVILII	1 03	anu	1003

	1		1						1	1			r.	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1							1	2	2	1	2	3
CO2	3	2	1	1	1				2	3	3	2	3	2
CO3	3	2	1	1	3	2			2	3	3	2	2	2
CO4	3	2	1	1	3	2			2	3	3	2	3	2
CO5	3	2	1	1	2				2	3	3	2	3	3

ASSESSMENT PATTERN - THEORY									
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %		
CAT1	20	35	45				100		
CAT2	10	30	60				100		
CAT3	15	25	60				100		
ESE	20	30	50				100		
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)									

22BCT32 - DATA STRUCTURES AND ALGORITHMS									
	(Common to Computer Systems and Design, Information Systems & Software Systems)								
Programme & Branch	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Ρ	Credit		
Prerequisites	Nil	3	PC	3	0	0	3		
Preamble	Preamble To impart the knowledge of basic data structure operations and algorithms. This course also discusses the application of the data structures.								
Unit – I	Unit – I Overview of data structures 9								
Introduction – I structures – Co cycle – Introduc	Introduction – Basic terminology of data organization – Concept of data type – Data structure defined – Description of various data structures – Common operations on data structures – Program design and development : Introduction – Program development life cycle – Introduction to algorithms – Programming constructs – Algorithm complexity – Big oh notation.								
Unit – II Linked list 9									
Introduction – Linear linked defined – Linear linked list – Representation – Operations – Doubly linked list – Representation – Operations - Types of lists – Applications of linked lists: Polynomial Manipulation.									
Unit – III Trees 9									
Introduction – Representation	ree defined – Tree terminology – Binary trees - Binary search trees – F – Height of an AVL trees – Operations - Threaded binary trees.	Represer	ntation – Ope	ratio	ns - A	VL tr	ees –		
Unit – IV	Graphs						9		
Introduction – ( Finding shortes	raph terminology – Representation of graphs – Operations on graphs -	– Applica	ations of grap	h: To	opolo	gical	Sort–		
Unit – V	Sorting and Searching						9		
Introduction – S – Linear search	orting – Bubble sort – Selection sort – Insertion sort – Radix sort – Mer – Binary search.	rge sort -	- Quick sort -	- Hea	ap so	rt – S	earching		
							Total:45		
TEXT BOOK:									
1. R.S.Salaria, "Data Structures & Algorithms using C", 5th Edition, Khanna Book Publishing Co (p) Ltd, New Delhi, 2022.									
REFERENCES:									
1. Tremblay Jean-Paul and Sorensen Paul, "An Introduction to Data Structures with Applications", 2nd Edition, Tata McGraw Hill, New Delhi, 2017.									
2. Vijayalakshmi Pai G.A, "Data Structures and Algorithms – Concepts, Techniques and Applications", 1st Edition, McGraw Hill Education, New Delhi, 2017.									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	develop an algorithm for a problem statement	Understanding (K2)
CO2	apply the concept of linked list	Applying (K3)
CO3	describe the concept of trees and its operation	Understanding (K2)
CO4	describe the functionalities of graph	Applying (K3)
CO5	demonstrate sorting and searching techniques	Understanding (K2)

	Mapping of COs with POs and PSOs													
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1											1	3
CO2	3	2	1	1									2	3
CO3	2	1											1	3
CO4	3	2	1	1									2	3
CO5	2	1											1	3

ASSESSMENT PATTERN - THEORY											
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %				
CAT1	35	40	25	-	-	-	100				
CAT2	35	40	25	-	-	-	100				
CAT3	35	35	30	-	-	-	100				
ESE 25 40 35 100											
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)											

		22BCT33 - DATABASE MANAGEMENT SY	STEMS							
		(Common to Computer Systems and Design, Information Syst	ems & So	oftware Syste	ms)					
Progra Branc	amme & h	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Ρ	Credit		
Prerec	luisites	Nil	3	PC	3	0	0	3		
Preamble To interpret the knowledge about various aspects of database design, database languages and database system implementation.										
Unit –	I	Introduction and Database Design Model:						9		
Databa Model: Key - F	ase Schema Overview o Removing Ro	<ul> <li>Keys – Relational Algebra – The Select Operation – The proje</li> <li>f the Design Process - The Entity-Relationship Model – Complex</li> <li>edundant Attributes in Entity Sets - Reducing E-R diagrams to Re</li> </ul>	ct Operat Attribute elational S	ion - Databas s – Mapping Schemas - Ex	card	esign inaliti ed E	and the second stand the second standard stand Standard standard stand Standard standard stan	he E-R Primary atures.		
Unit - II         Introduction to SQL:         9           Overview of SQL Query Language - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - Set         9										
Operations - Null Values - Aggregate Functions - Nested Sub Queries - Modification of the Database.										
Unit –		Intermediate and Advanced SQL:						9		
Interm Data T	ediate SQL : ypes and So	Join Expressions - Views - Materialized Views - Transactions - ( chemas - Authorization. Advanced SQL: Functions and Procedure	Commit - es – Trigg	Rollback - Int gers.	egrit	y Cor	nstrair	nts - SQL		
Unit –	IV	Relational Database Design:		•				9		
Featur Third N Norma	es of Good Iormal Form I Form.	Relational Designs - Functional Dependency - Atomic Domains a - Boyce-Codd Normal Form – Multi-valued Dependency and Fo	and First ourth Nor	Normal Form mal Form - J	n - Se oin D	econo Deper	d Norr	nal Form - y and Fifth		
Unit –	V	Transactions and Concurrency Control:						9		
Transa Transa Protoc	ctions - Tra ction Isolation	nsaction Concept - A Simple Transaction Model – Storage Stion - Serializability. Concurrency Control: Lock Based Protocols -	ructure - Timestar	Transaction mp Based Pro	Atom	nicity ols - \	and [ /alidat	Durability - tion Based		
								Total:45		
TEXT	BOOK:									
1.	Silberscha Education	tz Abraham, Korth Henry F., and Sudarshan S., "Database Syste (India) Pvt. Ltd., New Delhi, 2021.	em Conce	epts", 7th Edit	ion, I	McGr	aw Hi	II		
REFE	RENCES:									
1.	Elmasri Ra	amez, Navathe Shamkant B, "Fundamentals of Database System	ıs", 7th E	dition, Pearso	on, 20	016.				
2.	Ramakrishnan Raghu, Gehrke Johannes, "Database Management Systems", 3rd Edition, McGraw Hill Education, 2014.									

COUR On co	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	develop E-R model for database related applications	Applying (K3)
CO2	execute SQL expressions using SET operations and aggregate functions	Applying (K3)
CO3	develop SQL expressions using join operations	Applying (K3)
CO4	apply normalization technique to avoid redundancy in database	Applying (K3)
CO5	interpret the transaction and concurrency control concepts	Understanding (K2)

					Mappin	g of CC	s with	POs an	d PSOs	S				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1									2	3
CO2	3	2	1	1									2	3
CO3	3	2	1	1									2	3
CO4	3	2	1	1									2	3
CO5	2	1											1	2
		-	<b>.</b>			_								

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	40	40				100
CAT2	20	40	40				100
CAT3	20	50	30				100
ESE	20	45	35				100
* ±3% may be varied (	CAT 1,2,3 – 50 mark	s & ESE – 100 mai	<sup>r</sup> ks)				

		22BCT34– COMPUTER ORGANIZATIO	N					
		(Common to Computer Systems and Design, Information Systems	ems & S	oftware Syste	ems)			
Progra Branci	amme & h	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Р	Credit
Prereq	uisites	Digital Principles and Logic Design	3	PC	3	1	0	4
			1			1		
Pream	ble	This course deals with the basic concepts of computer architec participants to have a clear view as to how a computer system	cture and works.	l organizatior	that	can	help t	he
Unit –		Basic Computer Organization:						9+3
Introdu Registe and De Refere	iction: Digital er Transfer: F esign: Instruc nce Instructio	Computers - Computer Organization and Architecture– Basi Register Transfer Language – Register Transfer – Bus and Me tion codes- Computer Registers – Computer Instructions – Tir ns-Input-output and Interrupt- Complete Computer Description.	ic Issues emory Tr ming and	s-Basic Orga ansfer - Bas d Control - Ir	inizat ic Co nstruc	ion o mpu ction	of a c ter Or cycle	computer - rganization - Memory
Unit –	II	Computer Design and Arithmetic operations:				_		9+3
Basic Introdu Arithmo	Computer Or Iction – Addi etic Operatior	ganization and Design: Design of Basic Computer – Design tion and Subtraction – Multiplication Algorithms -Division Alg is.	of Accu Jorithms	umulator logi – Decimal <i>i</i>	c - ( Arithr	Comp netic	outer Unit	Arithmetic: - Decimal
Unit –		Input – Output Organization:						9+3
Periph Initiate Proces	eral Devices d I/O – Prior sor - CPU-IO	<ul> <li>Input-Output Interface – Asynchronous Data Transfer – Monity Interrupt – Direct Memory Access - Bus Arbitration – DMA</li> <li>P Communication – Intel 8089 IOP.</li> </ul>	des of T A Contro	ransfer - Pro oller – DMA	ograr Tran	nmeo sfer–	d I/O Inpu	<ul> <li>Interrupt</li> <li>t – Output</li> </ul>
Unit –	IV	Memory Organization:						9+3
Memor Techno Memor	ry Hierarchy ology – ROM ry – Virtual Me	<ul> <li>Main Memory - RAM and ROM Chips – Memory Address M – PROM -EEPROM – Flash Memory – RAM Technologies – Ad emory.</li> </ul>	∕lap – M uxiliary N	lemory Conn ⁄Iemory – As	ectio socia	n to tive l	CPU Memc	<ul> <li>Memory</li> <li>Memory</li> <li>Ory</li> <li>Cache</li> </ul>
Unit –	V	Pipeline and Vector Processing:						9+3
Paralle Operat SIMD /	el Processing ions –Matrix Array Process	<ul> <li>Pipelining – Arithmetic pipeline – Instruction Pipeline – multiplications – Memory Interleaving – Super Computers – A or.</li> </ul>	RISC Pi Array Pro	ipeline – Ve ocessor - Att	ctor ache	Proc d Ar	essing ray P	g - Vector rocessor –
				Lecture	:45, "	Futo	rial:15	5, Total:60
TEXT	BOOK:							
1.	M. Morris M	ano, "Computer System Architecture", 3rd Edition, Pearson Indi	a Educa	tion Pvt.Ltd.,	2021	•		
REFER	RENCES:							
1.	Hamacher (	Carl, Vranesic Zvonko, ZakySafwat, "Computer Organization", 5t	h Edition	n, McGraw Hi	ll Edu	ucatio	on, 20	16.
2.	John P.Hay	es, "Computer Architecture and Organization", 3 <sup>rd</sup> Edition, McGra	aw Hill Ec	ducation, 201	7.			

COUR	SE OUTCOMES:	BT Mapped
On co	mpletion of the course, the students will be able to	(Highest Level)
CO1	demonstrate the power of stored program general purpose device and describe the internal operations of the computer.	Understanding (K2)
CO2	illustrate the arithmetic algorithms for addition, subtraction, multiplication and division with the usage of digital hardware.	Applying (K3)
CO3	outline the input – output organization of computer	Understanding (K2)
CO4	to explain the function of each element of a memory hierarchy	Understanding (K2)
CO5	illustrate the concept of pipelining to increase the processing speed	Understanding (K2)

Mapping of COs with POs and PSOs														
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1											1	3
CO2	3	2	1	1									2	3
CO3	2	1											2	3
CO4	2	1											1	3
CO5	2	1											2	3
1 – Slight, 2	- Mode	rate, 3 –	Substanti	ial, BT-	Bloom's	Taxonor	nv							
-							,							
					ASSE	SSMEN	T PATT	ERN -	THEOR	Y				
Test / Bl Catego	oom's ory*	Re	memberi (K1) %	ng L	ASSES Indersta (K2)	SSMEN <sup>®</sup> anding %	T PATT Apply (K3)	ERN - /ing %	THEOR Analyzi (K4) S	Y ng I %	Evaluating (K5) %	Crea	ating (K6) %	Total %
Test / Bl Catego CAT	oom's ory* 1	Re	<b>memberi</b> (K1) % 30	ng L	ASSES Indersta (K2)	SSMEN anding %	T PATT Apply (K3) 20	ERN - /ing %	THEOR Analyzi (K4) 9	Y ng I %	Evaluating (K5) %	) Crea	ating (K6) %	<b>Total</b> % 100
Test / Bl Categ CAT CAT	oom's ory* 1	Re	memberi (K1) % 30 20	ng L	ASSE Indersta (K2) 50 50	SSMEN anding %	T PATT Apply (K3) 20 30	ERN - <sup>-</sup> /ing %	THEOR Analyzi (K4) S	Y ng I %	Evaluating (K5) %	) Crea	ating (K6) %	<b>Total</b> % 100 100
Test / Bl Catego CAT CAT CAT	oom's ory* 1 -2 -3	Re	memberi (K1) % 30 20 30	ng L	ASSE: Indersta (K2) 50 50 70	SSMEN anding %	T PATT Apply (K3) 20 30	ERN - <sup>-</sup> /ing %	THEOR Analyzi (K4) S	Y ng I %	Evaluating (K5) %	) Crea	ating (K6) %	<b>Total</b> % 100 100 100
Test / Bl Catego CAT CAT CAT	oom's ory* -1 -2 -3 =	Re	memberi (K1) % 30 20 30 20	ng L	ASSE Indersta (K2) 50 50 70 60	SSMEN anding %	<b>T PATT</b> Apply (K3) 20 30	ERN - <sup>-</sup> /ing % ) )	THEOR Analyzi (K4) S	Y ng I %	Evaluating (K5) %	j Crea	ating (K6) %	<b>Total</b> % 100 100 100 100

		22BCT35 – SOFTWARE ENGINEERIN	١G					
		(Common to Computer Systems and Design, Information Syste	ems & S	oftware Syste	ems)			
Progra Branch	mme & 1	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Ρ	Credit
Prereq	uisites	Nil	3	PC	3	1	0	4
			1					1
Pream	ble	This course introduces the software engineering concepts and requirement analysis, design, risk management and testing	software	e developmer	nt life	cycle	e. It fo	cuses on
Unit –		Software Process Models:						9+3
Introdu Task s Specia	ction: Softwa et – Proces lized Proces	are Engineering – Software Process - A Generic Process Model ss Patterns – Process Assessment and Improvement – Proc s Models - Unified Process – Case Study: Identification and anal	<ul> <li>Definition</li> <li>Definition</li></ul>	ing a framewo odels: Prescr process mode	ork a iptiv I.	activit e Pro	y – Id ocess	lentifying a Models –
Unit –		Requirements Engineering:						9+3
Require Develo Require for Wel	ements Eng ping Use c ements – Re o/Mobile App	gineering: Requirements Engineering Tasks – Establishing ases – Building the Analysis Model – Negotiating Requirem equirements Modeling: Scenario-Based Methods – Class-Based I os.	the Gro nents –R Methods	oundwork – Requirements a. Case Study	Elici Mo : Re	ting nitori quire	requii ng – ments	rements – Validating s model
Unit –		Design Engineering:						9+3
Design Elemer	Engineering nts – Interfac	g: Design Process – Design concepts – The Design Model: Data e Design Elements – Component-level design Elements – Deplo	Design I byment-L	Elements- Are Level Design	chite Elen	ctura nents	l Desi	ign
Unit –	IV	Risk Management:						9+3
Risk M Refiner Case S	lanagement: nent – Risk study: Effort	Reactive and Proactive Risk strategies – Software Risks - Mitigation, Monitoring and Management – RMMM Plan. Estima Estimation using COCOMO model.	Risk Ide ation for	entification, F Software Pr	Risk ojec	Proje ts: C(	ection OCON	and Risk MO Model.
Unit –	V	Software Testing and Agile Development:						9+3
Softwa Box Te Case S	re Testing: I sting – Agil study: Writing	ssues – Unit Testing - Integration Testing – Validation Testing e development: Agility – Agile Process – Extreme Programming g test cases for Mobile Apps.	- Syster g – Scru	m Testing - B ım – A Tool s	lack set f	Box or the	Testi e Agile	ng - White e Process.
				Lecture:	45,	Tutor	ial:15	5, Total:60
TEXT E	BOOK:							
1.	Roger S.P.	ressman and Bruce R. Maxim, "Software Engineering- A Practitic al Edition, 2019.	oner"s A	pproach", 8th	Edit	ion, N	McGra	aw-Hill
REFER	RENCES:							
1.	lan Somme	erville, "Software Engineering", 10th Edition, Pearson Education,	2016.					
2.	Pankaj Jalo Reprint 20	ote, "An Integrated Approach to Software Engineering", Third Edi 14.	ition, Na	rosa Publishi	ng H	ouse	Pvt. I	Ltd.,

COUR	SE OUTCOMES:	BT Mapped
On co	mpletion of the course, the students will be able to	(Highest Level)
CO1	understand the concepts of software processes and software process models	Understanding (K2)
CO2	develop scenario-based models and class-based models for software systems	Applying (K3)
CO3	describe the design concepts and models in Software Engineering	Understanding (K2)
CO4	calculate effort estimation for an application using COCOMO model	Applying (K3)
CO5	explain the testing strategies for ensuring software quality	Understanding (K2)
	Mapping of COs with POs and PSOs	

COs/POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02           CO1         2         1         1               2         3         2         1         1               2         3         2         3         3         2         3         3         2         3         3         3         2         3 <td< th=""></td<>														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1		1									3	2
CO2	3	2	1	1									2	3
CO3	3	2	1	1									2	3
CO4	3	2	1	1									2	3
CO5	3	2	1	1									2	3
1 – Slight, 2	2 – Mod	erate, 3 -	Substant	tial, BT-	Bloom's	Taxono	my							

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	30	60	10				100
CAT2	30	50	20				100
CAT3	30	50	20				100
ESE	30	50	20				100
* ±3% may be varied (	CAT 1,2,3 – 50 mar	ks & ESE – 100 ma	irks)			·	

		22BCL31 - PYTHON PROGRAMMING LAB	ORATO	RY				
		(Common to Computer Systems and Design, Information Sy	/stems &	Software Sy	ster	ns)		
Progra Branc	amme & h	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Р	Credit
Prerec	quisites	Nil	3	PC	0	0	4	2
Pream	ble	This course provides the knowledge in the core concepts developing python programs using core programming feat	of pythor tures.	n programmir	ng. I	t emp	hasiz	es on
LIST C	OF EXPER	RIMENTS / EXERCISES:						
	Implem	entation of the conditional and looping statements:-						
1.	a. b. c.	Write a program to find the greatest among three numbers Program to accept any number and prints the number of digit Write a program to generate square, triangle, diamond patter	s in the g n using *	given number				
	Implem	entation the conditional and looping statements:-						
2.	a. b.	Write a program to read two numbers. Then find out whether number. Write a program to sum the series 1**2/1+2**2/2++n**2/n	the first r	number is a n	nulti	ple of	the s	econd
	C.	Write a program to prints all the prime number for 50 to 1.						
	Implem	entation of functions:-						
3.	a. b.	Write a function is_prime() that returns a1 if the argument pas otherwise. Write a program that uses lambda function to multiply two nur	sed to it mbers.	is a prime nu	mbe	er and	la0	
	C.	Write a program to concatenate two strings using recursion.						
	Implem	entation of functions:-						
4.	a.	Demonstrate the various parameters passing type to the func True if any of the integers is 0, otherwise it returns False.	tion that	accepts three	e int	egers	and I	eturns
	D. C.	Write a program to swap two variables that are defined as gid Write a program to print n terms of the Fibonacci series using	i recursic	idie. In				
	Implem	entation of the various string operations:-						
5	a.	Write a program to print the mirror of the given string.("abc'->"c	ba') and	check for pali	ndro	ome.		
5.	b. c.	Write a program to count the number of characters, words an Write a program that accepts a comma separated sequence of it.	id lines ir of words	n the given te as input and	xt. prin	ts the	uniq	ue words
	Implem	entation of the regular expressions:-						
6.	a. b.	Write a program to check whether a string starts with specifie Write a program to remove leading and trailing spaces from a Write a program to match strings which starts with an upper of	ed charac a sting.	eter.	dby	, a dia	uit on	4 0
	Impler	nentation of the list operations:-	ase chai		uby	a ulç	jit and	1a,,-,,.
7.	a.	Make a list of first ten letters of the alphabet, apply slice for th i. Print the first three letters from the list ii. Print any three letters from the middle of the list	ne followi	ng				
	b. c.	iii. Print the letters from any particular index to the end Write a program that creates a list of numbers from 1 to 75 th Write a program to create a tuple from the list and do the vice	of the lis at are eit versa.	t. ther divisible	by 4	l or by	/5.	
	Implem	entation of tuple and dictionary concepts:-						
8.	a. b.	Create a tuple that has just one element which in turn may hav length of the tuple. Write a snake and ladder game program using dictionary.	ve three	elements "a',"b	o' an	d "c'. F	Print t	le
	C.	Write a program that has a dictionary of your friends name(ke dictionary in a sorted order. Prompt the user to enter a name the name does not exit, then ask the user to enter the birthda	ey) and b and che ly and ac	oirthday. Print ck if it is pres Id it to the dic	the ent	items in the ary.	s in th dictio	e onary. If
9.	Implem	entation of classes and objects:-						
-	a.	Write a python program to deposit or withdraw money in a ba	nk accou	unt using clas	is ar	nd obj	ect.	

	-														
		b. V o	Vrite a p f 10 stu	ython pr dents. D	rogram )isplay a	that has all the in	s a class formatio	s studei on store	nt that s d abou	tores ro t 10 stud	II numbe dents.	r, name ar	nd marks	s(in five su	ıbjects)
	Imp	lemen	tation of	polymo	rphism	and Inh	eritance	e conce	pts:-						
10.															
		a. v b. V	vrite a p Vrite a p	rogram	to perio to demo	orm poly onstrate	Multipl	sm. e inheri	tance a	nd Multi	-level inh	eritance.			
		-		- 3 -			1								Fotal:60
REFE	RENC	CES/ M	ANUAL	/SOFT	WARE:										
1.	Lab	oratory	/ Manua	ıl											
COUR	SE O	UTCO	MES:											BT Map	ped
On co	mple	tion of	the cou	urse, th	e stude	ents wil	l be abl	le to					(	Highest L	evel)
CO1	so	lve pro	blems u	sing cor	e pytho	n progra	amming							Applying( Imitation	K3), (S1)
CO2	im	plemer	nt functio	on and d	lata type	es for so	olving p	roblems	3				N	Applying( Ianipulatio	(K3), on(S2)
0.03	de	monstr	ate nolv	mornhis	m and i	inherita	nce							Applying(	K3),
005	ue	monsu	ale poly	morphic	anu	Innenta								Precision	(S3)
						Маррі	ng of C	os with	n POs a	nd PSC	Ds				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	2	1	1									2	3
CO2	2	3	2	1	1									2	3
CO3	3	3	2	1	1									2	3
1 – Slię	ght, 2	– Mod	erate, 3	- Subst	antial, I	BT- Bloc	m's Ta	xonomy					1	1	

					22B	CL32 -	DATAS	STRUC	TURES	LABO	RATORY	,				
	(Common to Computer Systems and Design, Information Systems & Software Systems)															
Progra Branch	imme & h		B.Sc Syste	& Com ems, Sc	puter S oftware	System: Syster	s and D ns	esign,	Inform	ation	Sem.	Catego	ory L	т	Р	Credit
Prereq	uisites		Prob	lem Sol	lving aı	nd Prog	grammi	ng in C			3	PC	0	0	4	2
Pream	ble		To im	plemen	t linear	and no	n linear	data st	ructure	operatio	ons, algo	rithms and	d its app	licati	ons.	
LIST O	F EXPE	RIN	IENTS	/ EXER	CISES:											
1.	Impler	nent	ation of	fsingly	Linked	List Op	erations	5								
2.	Impler	nent	tation of	f Doubly	/ Linked	List O	peratior	IS								
3.	Polyn	omia	al additi	on usin	g Linke	d List										
4.	Binary Tree Creation and Traversal															
5.	Implei	men	tation o	f differe	ent oper	ations o	on a bin	ary sea	rch tree	1						
6.	Implei	men	tation o	f Graph	Repre	sentatio	'n									
7.	Implei	men	tation o	f Graph	Traver	sals										
8.	Perfo	min	g Bubb	le Sort a	and Inse	ertion S	ort									
9.	Perfo	min	g Selec	tion So	rt and C	uick So	ort									
10.	Perfo	min	g Linea	r and B	inary Se	earch										
																Total:60
REFER	RENCES	5/ M.	ANUAL	/SOFT	WARE	:										
1.	Labora	atory	/ Manua	al												
COURS	SE OUT	COI	MES:										BT	Мар	ped	
On cor	mpletio	n of	the co	urse, th	ne stud	ents wi	ll be ab	ole to					(High	est L	.evel)	
CO1	code t	he o	peratio	ns of lin	ked list	, tree ai	nd grap	h data s	structure	es			Imita	ation	(S1)	
CO2	perfor	n sc	orting ar	nd sear	ching or	n a give	n datas	et					Appl Manip	ying( ulatio	(K3), on(S2)	
CO3	solve	he p	oroblem	ı by app	lying pr	ogramr	ning ski	lls					Appl Prec	ying( ision	(K3), (S3)	
				-	-	Марр	ing of	Cos wit	h POs	and PS	Os					
COs/P	Os P	<b>D1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	2	PSO1	PSO2
CO1	;	3	2	1	1										2	3
CO2	2 ;	3	2	1	1										2	3
CO3	sht 2	3	2 arata 2	1	1	-ים דם		vonorei							2	3
	22BCL33 - DATABASE MANAGEMENT SYSTEMS LABORATORY															
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			(Comm	on to Co	omputer	Syster	ns and	Design,	Informa	ation Sy	stems &	Software S	yste	ms)		
Progra Branci	amme h	&	B.Sc Syste	& Com ms, So	puter S ftware	ystems Systen	and D	esign, l	nforma	tion	Sem.	Category	L	٦	ГР	Credit
Prereq	luisite	s	NIL								3	PC	0	(	) 4	2
Pream	ble															
LIST O	F EXF	PERIN	IENTS	EXER	CISES:											
1.	Study of DDL commands, DML commands, DCL commands and TCL commands.															
2.	Design relations to implement the integrity constraints (primary key, foreign key, unique and check).															
3.	Apply aggregate functions to group the values of multiple rows.															
4.	Implement group by functions with having clause.															
5.	Retrieval of data from one or more relations with nested sub queries.															
6.	Apply join operations to retrieve data from multiple relations.															
7.	Construct views from a single table/ multiple tables and demonstrate the manipulation of views.															
8.	Develop PL/SQL functions with select and update statements.															
9.	Deve	elop st	tored ar	nd unna	med PL	/SQL p	rocedur	es to re	trieve d	ata fron	n a relati	on.				
10.	Dem	nonstra	ate the e	executio	on of Tri	ggers w	heneve	er the in	sertion	or delet	ion even	t occurs in t	he d	atak	oase.	
																Total:60
REFEF	RENCE	ES/ M	ANUAL	/SOFT	WARE:											
1.	Labo	oratory	/ Manua	al												
COUR	SE OU	JTCOI	MES:										BT	Ma	pped	
On cor	mpieti	ion of	the col	urse, th	e stude	ents wil	I be ab	le to				(	App	lest lvind		
CO1	des	sign da	itabase	for stud	lent and	bankin	g applic	cations.				N	lanip	ulat	ion (S2)	
CO2	exe on a	cute a a data	iggrega base.	te functi	ions, vie	ews, joir	n operat	tions an	d neste	d sub-c	lueries	Ν	App lanip	lying ulat	g (K3), ion (S2)	
CO3	mar	nipulat	te datab	ase usi	ng PL/S	SQL fun	ctions a	and proc	edures	•		N	App lanip	lying ulat	g (K3), ion (S2)	
	Mapping of Cos with POs and PSOs															
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO	12	PSO1	PSO2
CO1		3	2	1	1										2	3
CO2	2	3	2	1	1										2	3
CO3	D3 3 2 1 1 2 3															

	B.Sc & Computer Systems and Design. Information	Category	L	Т	Р	Credit
sranch	Systems, Software Systems	EC	0	0	80	2
Preamble	This subject is to enhance the employability skills and to	develop caree	er compe	etency	I	
Prerequisites	Nil					
UNIT - I	Soft Skills - I					20
knowledge upgrad business etiquette- Telephone etiquette	ation-Self-confidence. Professional grooming and practic Basics of etiquette-Introductions and greetings-Rules of the Body Language.	ces: Basics o e handshake, e	e corpo earning	rate cul respect,	ture-Key busines	y pillars s manner
UNIT-II	Quantitative Aptitude & Logical Reasoning - I					30
arrangement	Grammar, Vocabulary, Listening, Speaking, Reading	g & Writing			[	30
Grammar: Parts of s Syllogism - Spellir Podcasts - Speakin pauses, slurs and f Jumbled sentences Writing skills for IEL	speech - Tenses - Articles and Prepositions - Vocabulary: S ng test - Cloze test - Concord - Spotting Errors - Listening g : Mock Interviews - Personality traits - Better pronunciation illers - Soft skills - Writing: Job application letter & resur - Professional e-mail writing - Business letters - One pag TS	ynonyms & An g: Listening to n - Extempore ne - Video re e essay - Repo	tonyms TED ta talk - Re sume – ort writin	- Analog Iks, ESL eading: F Differer g - Editi	ies & ESC Reading nt types ng & pro	DL Videos with stres of writing ofreading
						Total
Textbook:						
Textbook: 1. Edgar Thorpe ar Services Pvt L	d Showick Thorpe, "Objective English for Competitive Exan td, 2017.	nination", 6th E	dition, F	earson	India Edi	ucation
Textbook: 1. Edgar Thorpe ar Services Pvt L References:	d Showick Thorpe, "Objective English for Competitive Exan td, 2017.	nination", 6th E	dition, F	Pearson	India Edi	ucation

COURS	OURSE OUTCOMES:													BT Mapped (Highest Level)			
On com	pletion	of the	course, t	he stude	nts will b	e able to							(righe	St Level	)		
CO1:	develop the soft skills of learners to support them work efficiently in an organization as an individualApplying (K3),and as a teamPrecision (S3)																
CO2:	solve real time problems using numerical ability and logical reasoning       Applying (K3), Precision (S3)																
CO3:	3:       apply English language skills for various academic and professional purposes       Applying (K3), Precision (S3)																
	Mapping of COs with POs and PSOs																
COs/PO	)s I	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2		
CO1		3	2				3	3		3		3	2				
CO2		3	2				3	3		3		3	2				
CO3	CO3         2         3         3         3         3         2																
1 – Sligh	1 – Slight, 2 – Moderate, 3 – Substantial, BT – Bloom's Taxonomy																

#### ASSESSMENT PATTERN

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	50	30				100
CAT2		50	50				100
CAT3		50	50				100
ESE	NA						

		22BCT41- USER INTERFACE TECHNOLO	GIES					
		(Common to Computer Systems and Design, Information System	ms & So	ftware Syster	ns)			
Progra Branch	mme & N	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Ρ	Credit
Prereq	uisites	Web Programming	4	PC	3	0	0	3
Preamb	ble	This course provides an introduction to HTML, CSS, Client-Side course also addresses the application of ReactJS for developin	e JS and Ig web a	Server-Side pplications.	JS I	Frame	ework	. The
Unit – I		HTML & CSS:						9
Introdu Cascac Queries	ction to HTML ling Style She s – Dropdown	.: Basic tags – Headings – Links – Images – Tables - HTML Fe et: Types of CSS – Positioning Elements – Backgrounds - Box I Menus.	orms inp Model ar	out Types – I nd Text Flow	Page ∙ Me	e-Stru dia Ty	cture ypes a	Elements. and Media
Unit – I		Java Script:						9
Introdu Functio	ction – Operat ns: Function [	ors – Control Structures: Selection: if – if-else – switch. Repetitio Definition – Scope Rules – Recursion. Array: Declaration – Initiali	n: while zation –	<ul> <li>do-while –</li> <li>Growing Arra</li> </ul>	for – ays.	brea	k and	continue.
Unit – I	11	Node JS:						9
Node J POST i	S: Introductior mplementation	n – Architecture – Features – Creating Web Servers with HTTP R n - Connect to NoSQL Database using Node JS – Implementation	equest - n of CRI	<ul> <li>Response -</li> <li>JD operations</li> </ul>	- Eve s.	ent Ha	andlin	g - GET &
Unit –	V	ReactJS Basics:						9
React: – Comp	Introduction – ponent API – (	Installation – create React app – components – state – props - p Component Life cycle – Forms – controlled and uncontrolled com	rops val ponent -	idation – stat - Events – co	e vs nditi	props onal r	s – co endei	nstructor ring.
Unit – '	V	ReactJS Animation and API:						9
ReactJ	S: list – keys -	- refs – Fragments - Router – CSS – Animation – Map – Table –	Code sp	litting – hook	s – f	ux co	ncept	ts.
								Total:45
TEXT E	BOOK:							
1.	Paul Deitel, I Education, N	Harvey Deitel, Abbey Deitel, "Internet and World Wide Web - Hov lew Delhi, 2019. For Unit – I, II	v To Pro	gram", 5th E	ditior	n, Pea	arson	
2.	Infosys camp	ous connects material for Unit III.						
3.	javatpoint.co	m for Unit IV, V						
REFER	ENCES:							
1.	DT Editorial Dreamtech F	Services, "HTML 5 Black Book (Covers CSS3, JavaScript, XML, Press, New Delhi, 2016.	XHTML,	AJAX, PHP,	jQu	ery)",	2nd E	Edition,
2.	Randy Conn	olly, Ricardo Hoar, "Fundamentals of Web Development", Pearso	on Educa	ation, New De	elhi 2	2015		

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	design static web pages using HTML and CSS.	Applying (K3)
CO2	develop interactive and dynamic web pages using JavaScript.	Applying (K3)
CO3	develop a web application using Node JS with database connectivity.	Applying (K3)
CO4	understand the features of React to manage event handling.	Understanding (K2)
CO5	utilize React JS framework to develop web applications.	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1									2	3
CO2	3	2	1	1									2	3
CO3	3	2	1	1									2	3
CO4	2	1											1	2
CO5	3	2	1	1									2	3
1 – Slight, 2	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

ASSESSMENT PATTERN – THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	20	30	50	-	-	-	100						
CAT2	20	40	40	-	-	-	100						
CAT3	20	50	30	-	-	-	100						
ESE	20	35	45	-	-	-	100						
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)													

B.Sc – Information Systems, Regulation, Curriculum and Syllabus – R2022

#### 22BIT41 - CRYPTOGRAPHY AND NETWORK SECURITY

Prograr Branch	nme&	B.Sc – Information Systems	Sem	Category	L	т	Ρ	Credit						
Prerequ	uisites	Nil	4	PC	3	0	0	3						
		-			1	1	1							
Preamb	ole	To understand the fundamentals of cryptography, acquire know	vledge o	f standard alg	orith	nms t	o ensi	ure						
	confidentiality, integrity and authenticity and to realize the security challenges in networks.													
Unit – I	Unit – I Computer & network security concepts, symmetric ciphers:													
Comput Security for Netw Techniq	er and Netw Services - work Securi Jues – Stega	work Security Concepts: Computer Security Concepts - The C Security Mechanisms - Fundamental Security Design Principles ty - Classical Encryption techniques: Symmetric Cipher Mod nography.	OSI Sec - Attack lel – Su	urity Architec Surfaces an bstitution Teo	ture d At chnie	- Se tack ques	ecurity Trees - Tra	Attacks - - A Model						
Unit – II Block ciphers and number theory:														
Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Structure - The Data Encryption Standard - D Example - The Strength of DES - Block Cipher Design Principles. Introduction to Number Theory: Divisibility and the Divisi algorithm - The Euclidean Algorithm - Modular Arithmetic - Prime Numbers - Fermat"s and Euler"s Theorems - Discre Logarithms.														
Unit – I		Asymmetric ciphers:						9						
Public-K - Diffie- Pseudor	Key Cryptogi -Hellman Ke random Nun	aphy and RSA: Principles of Public-Key Cryptosystems - The RS by Exchange - Elgamal Cryptographic System - Elliptic Curv nber Generation Based on an Asymmetric Cipher.	SA Algor ve Arithn	ithm - Other F netic – Ellipti	Publi c C	cKey urve	Crypt Crypt	osystems ography -						
Unit – I	IV	Cryptographic Data Integrity Algorithms:						9						
Cryptog Security Attacks digital si	raphic Hash - Hash Fun and Forgeri ignature Alg	<ul> <li>Functions: Applications of Cryptographic Hash Functions - Tw ctions Based on Cipher Block Chaining - Secure Hash Algorithm es, Digital Signature Requirements, Direct Digital Signature - RS orithm.</li> </ul>	vo Simple n (SHA) - SA – PSS	e Hash Funct Digital Signa	ions ture	- Re s - Pi	equirer operti	ments and es,						
Unit – V	V	Network and Internet Security:						9						
Network Security	CSecurity: B	rief introduction to TCP/IP – Firewalls – IP Security – Virtual Priv Secure Socket Layer (SSL) – Email Security.	ate Netv	vorks (VPN)-	Intru	ision	– Inte	rnet						
							To	tal:45						
TEXT B	OOK:													
1.	William Sta 2019 for Ur	llings, "Cryptography and Network Security – Principles and Prac it I,II,III,IV.	ctices", 7	th Edition, Pe	arso	on Ed	ucatio	n Limited,						
2.	Atul Kahate	, "Cryptography and Network Security", 4th Edition, Tata McGrav	w-Hill Ed	ucation Pvt. L	td,	2019	for Ur	nit V.						
REFERENCES:														
1.	Behrouz A. Hill Educati	Forouzan and Debdeep Mukhopadhyay, "Cryptography and Net on Pvt. Ltd, 2015.	work Se	curity", 3rd Ec	litior	n, Tat	a McG	Graw-						
2.	Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security", 7th Edition, Cengage Learning, Boston, 2021.													

COUR On col	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	describe key security requirements, design principles and various operation of classical substitution techniques to prevent the threats and vulnerability of information systems.	Understanding (K2)
CO2	understand the concepts of number theory in design of cryptographic algorithms and ensure the confidentiality by using private key cryptosystem.	Understanding (K2)
CO3	apply public key cryptosystems to ensure confidentiality.	Applying (K3)
CO4	apply hash functions and digital signature to ensure the data Integrity.	Applying (K3)
CO5	identify physical points of vulnerability in simple networks, internet and implement the policies and protocols to resolve security issues.	Applying (K3)

	Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	2	1											2	3	
CO2	2	1											2	3	
CO3	3	2	1	1									2	3	
CO4	3	2	1	1									2	3	
CO5	3	2	1	1									2	3	
1 – Slight, 2	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														

ASSESSMENT PATTERN - THEORY														
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	40	60					100							
CAT2	25	35	40				100							
CAT3	25	35	40				100							
ESE	20	40	40				100							
* , 20/ may be varied (							·							

		22BCT43 – MOBILE APPLICATION DEVELO	OPMENT								
		(Common to Computer Systems and Design, Information Systems	tems & S	oftware Syste	ems)						
Progra Branci	nmme & h	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Ρ	Credit			
Prerec	uisites	Java Programming	4	PC	3	0	0	3			
Pream	ble	To impart the fundamental knowledge and to create mobile ap	plication	using Android	d pro	gram	nming				
Unit –		Introduction:						9			
Getting Device Android Applica	y Started with s - Android d Studio for <i>i</i> ation.	Android Programming: Android: Android versions - Features Market - Android Studio - Android SDK - Creating AVDs - La Android Development: Exploring the IDE- Using code completio	of Andro aunching on - Debu	id - Architec the First An ugging the ap	ture droic oplica	of Ar I App ation	ndroid olicatio - Pub	I - Android on - Using Ilishing the			
Unit –		Activities, Fragments and Intent:						9			
Unders Linking Fragme Filters	standing Activ Activities us ents Dynamic - Displaying N	rities: Applying Styles and Themes to an Activity - Hiding the Ading Intents- Returning Results from an Intent - Passing Data usin ally - Life Cycle of a Fragment - Interaction between fragments Notifications.	ctivity Titl ng Intent - Underst	le - Dialog W Object – Frag tanding the Ir	indov gmer itent	v - P nts- A Obje	rogre: dding ct - U	ss Dialog - J sing Intent			
Unit – III     Android User Interface:     9											
Unders Layout Basic \	standing the -Scroll View- /iews – Prog	Components of a Screen - Views and View Groups – Linear I Utilizing the Action Bar - Adding Action Items to the Action Ba ress Bar view – Auto Complete Text View - Picker Views - List V	Layout – r –Desigi ′iews to d	Table Layou ning user inte lisplay long lis	t- Re erfac sts.	elativ e wit	e Lay h Viev	vout-Frame ws - Using			
Unit –	IV	Pictures, Menus and Content Providers:						9			
Using Method Conter	Images to Di ds - Options nt Provider - C	splay Pictures – Image View - Image Switcher – Grid View- I Menu - Context Menu - Using Web View – Web View - Conter Creating and Using Content Provider.	Jsing Me nt Provide	enus with Vie ers: Sharing I	ws - Data	Crea in Ai	ating ndroic	the Helper I - Using a			
Unit –	V	Data Persistence:						9			
Saving Prefere Option	and Loading ences Values - Creating ar	User Preferences - Accessing Preferences using an Activity - - Persisting Data to Files- Saving to internal storage - Saving to d Using Databases- Creating the DBAdapter Helper class - Using	Program o Externa ng the Da	matically Ret al storage - C atabase Progr	rievii hoos ramn	ng ar sing ti natica	nd Mo he Be ally.	difying the st Storage			
							То	tal:45			
TEXT	BOOK:										
1.	J.F. DiMarz	io, "Beginning Android Programming with Android Studio", 4th E	dition, Jo	ohn Wiley & s	ons,	Inc.,	2018				
REFE	RENCES:										
1.	Pradeep Ko	thari., " Android Application Development (with KitKat support) I	Black Boo	ok", dreamteo	:h Pr	ess,2	2018.				
2.	John Horton	n, " Android Programming for Beginnners", 2nd Edition,Packt Pu	Iblishing I	Ltd, 2018.							

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	explore the Android Studio Environment and Run the application using emulator	Understanding (K2)
CO2	apply the activities, fragments and Intents in android applications	Applying (K3)
CO3	design the application using Views and view Groups	Applying (K3)
CO4	demonstrate the apps which handle images and menus.	Applying (K3)
CO5	implement the different data storage mechanisms.	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1											1	3
CO2	3	2	1	1		1							2	3
CO3	3	2	1	1		1							2	3
CO4	3	2	1	1		1							2	3
CO5	3	2	1	1		1							2	3
1 Clight 0	Clickt 2. Mederate 2. Cubatential DT Discrete Tournamu													

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1	30	35	35				100					
CAT2	20	40	40				100					
CAT3	30	30	40				100					
ESE	20	30	50				100					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

	22BCT44 - COMPUTER NETWORK	S					
	(Common to Computer Systems and Design, Information System	ems & So	oftware Syste	ms)			
Programme & Branch	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	4	PC	3	1	0	4
Preamble	This course will help the students to gain knowledge in computechnologies. It further provides the functionalities of protocols	ter netwo in use at	ork componer t different laye	nts, n ers o	nodel f netv	s and vorks	
Unit – I	Introduction:						9+3
Overview of the In Scenarios-TCP/IP Transmission Med	nternet: Networks- Switching - The Internet- Accessing the Intern Protocol Suite-The OSI Model- Standards and Administration: lia: Guided Media-Unguided Media: Wireless.	net- Hard Internet	ware and So Standards -	ftwar Inte	e–Pr rnet	otoco Admiı	I Layering: nistration -
Unit – II	Application Layer:						9+3
Introduction: Prov Services of the T Secure Shell (SSI	ding Services-Application Layer Paradigms - Client-Server Parad ransport Layer-Standard Client-Server Applications: World Wide I)-Domain Name System (DNS).	digm: Ap Web and	plication Prog d HTTP-FTP	gram -Elec	ming troni	Interl c Mai	face-Using I-TELNET-
Unit – III	Transport Layer:						9+3
Introduction: Tran Selective Repeat (UDP): User Data connection – State	sport Layer Services- Transport Layer Protocols: Simple Protocol- Protocol- Bidirectional Protocols Piggybacking - Internet Transport gram-UDP Services-UDP Applications- Transmission Control Prot Transition Diagram - Flow Control-Error Control.	Stop and t Layer P ocol (TCI	Wait Protoco rotocols-User P): TCP Serv	ol- Go Data ices	o Bao agrar – Seg	ck N F n Pro gmen	Protocol- tocol t – a TCP
Unit – IV	Network Layer:						9+3
Introduction: Netw Layer Protocols: algorithms.	ork Layer Services – Network Layer Performance - Network Lay Pv4 Datagram format - IPv4 Addresses - Next Generation IP -	er Conge IPv6 Ad	estion - Struc Idressing – L	ture Inica	of a i st Ro	outer outing	- Network - Routing
Unit – V	Data Link Layer:						9+3
Introduction: Data Protocols (MAC): - Standard Ethern	Link Control (DLC) - Framing - Flow and Error Control - Error Deter Random Access -Controlled Access – Link Layer Addressing - Wi et- Fast Ethernet – Gigabit Ethernet.	ection an red LANs	d Correction Ethernet Pr	- Mu otoc	ltiple ol - IE	Acce EEE P	ss Project 802
			Lecture:	45, 1	Futor	ial:15	5, Total:60
TEXT BOOK:							
1. Forouzan Education	Behrouz A, Moshrraf Firouz, "Computer Networks A Top-Down A J, 2019.	pproach"	, 1st Edition,	Tata	McG	iraw H	Hill
<b>REFERENCES:</b>							
1. Kurose Ja New Delh	mes F. and Ross Keith W., "Computer Networking: A Top-Down / i, 2020.	Approach	n", 8th Edition	, Pea	arson	Educ	cation,
2. Andrew S	.Tanenbaum, Nick Feamster,David J.Wetherall, "Computer Netwo	orks", 6th	Edition, Pear	son	Educ	ation,	2020.
3. Behrouz	A. Forouzan, "Data Communications and Networking", 5th Edition,	McGraw	Hill Educatio	on, 20	017.		

COUR On cor	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	explain the network layered architecture and the data transfer through the Internet.	Understanding (K2)
CO2	interpret the functionalities of network applications like HTTP, FTP, DNS and Email	Understanding (K2)
CO3	outline the end-to-end functionalities of transport layer protocols	Understanding (K2)
CO4	apply IP addressing to construct forwarding and routing solutions	Applying (K3)
CO5	experiment the flow control and error control techniques at data link layer level	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1											3	2
CO2	2	1											2	3
CO3	2	1											2	3
CO4	3	2	1	1									2	3
CO5	3	2	1	1									2	3
4 01:														

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1	40	60					100					
CAT2	30	70					100					
CAT3	30	40	30				100					
ESE	20	50	30				100					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

22BCC41 - BIG DATA ANALYTICS											
		(Common to Computer Systems and Design, Information Syste	ems & So	oftware Syste	ms)						
Progra Branch	mme & N	B.Sc & Computer Systems and Design, Information Systems, Software Systems	Sem.	Category	L	٦	Г	Р	Credit		
Prereq	uisites	DATABASE MANAGEMENT SYSTEMS	4	PC	3	(	D	2	4		
Pream	ble	This course imparts the knowledge about Big Data, develops s insights on data streaming.	kill set in	analyzing of	Big o	da	ta an	d ge	et		
Unit –		Digital Data and Big Data:							9		
Types of Challer Produc Changi	of Digital Data nges – Volum e Information ng in Realms	a: Classification of Digital Data – Introduction to Big Data: Charace, Velocity and Variety – Other Characteristics of Big Data – Nee – Traditional BI vs Big Data – Typical Data Warehouse Environment of Big Data.	cteristics ed for Big ment – H	of Data – Ev g Data – Infor Iadoop Envirc	olutio matio onme	on on ent	– De Con : – Ne	efinit sum ew 1	tion – her or We Foday –		
Unit –	l <b>i</b> An abritanti	Big Data Analytics and Technology Landscape:	ata at Ch	allanana Ta				[	9 Taning Dig		
Data – Enviror	Importance c Importance c Iment– Base	of Big Data Analytics – Kind of Technologies – Data Science – D – Top Analytical Tools – Big Data Technology Landscape: NoSC	atest Ch ata Scie QL – Hao	ntist – Termin doop.	op Cr iolog	ies	s Use	es r ed ir	Big Data		
Unit –	11	Hadoop and Map Reduce:							9		
Hadoop Hadoop – Mana Introdu <b>Unit –</b>	b: Introduction Overview – Iging Resourd Intron – Mappel Intron – Mappel Introduction – Mappel Introdu	n – Need for Hadoop – Why not RDBMS – RDBMS vs Hadoop – Use Case of Hadoop – Hadoop Distributors – Hadoop Distribute ces and Applications with Hadoop Yarn – Interacting with Hadoop er – Reducer – Combiner – Partitioner – Searching – Sorting – C Cassandra:	Distribu d File S p Eco S Compres	ited Computin ystem – Proce ystem – Map I sion.	g Ch essin Redu	ial ig ice	lenge Data e Pro	es – witl grai	History – n Hadoop mming: <b>9</b>		
Apache Time to	e Cassandra - Live –Alter (	– Features of Cassandra – CQL Data Types – CQLSH – Keyspa Commands – Import and Export – Querying System Tables – Pra	ices – Ci actice Ex	rud – Collectio amples.	ons –	- L	Jsing	a C	ounter –		
Unit –	V	Spark and Streaming:							9		
Spark a	and Big data	analytics: Introduction – Spark – Introduction to data analysis wit	h Spark	<ul> <li>Programmii</li> </ul>	ng us	sin	ig RE	D a	and MLIB		
Stream	computing a	spects – Frequent Itemset – Real – Time Analytics platform.	- Dala Sli	ream concept	anu	IVI	lanay	Jem	ent –		
LIST O	FEXPERIME	ENTS / EXERCISES:									
1.	Perform file	management tasks using Hadoop commands.									
2.	Write a Map	Reduce program to count the frequency of each word in a text f	file								
3.	Write a Map	PReduce Program to analyse time-temperature statistics and get	nerate re	eport with max	⟨/min	te	empe	ratu	ire.		
4.	Implement	Cassandra CRUD operation in database									
5.	Perform the Cru Ad Re	e following operations in Cassandra collections eating sets, maps and lists Iding elements to the collections emoving elements from list									
6.	Apply the co	ommands to import and export data from/to CSV file in Casandra	a.								
7.	Implement t	the RDD Transformation functions in spark									
8.	Implement t	the RDD Action functions in spark.									
				Lecture:4	5, Pr	a	ctica	1:30	, Total:75		
TEXT E	BOOK:										
1.	Seema Acharya , Subhashini Chellapan, "Big Data And Analytics", 2nd Edition, Wiley, 2019 (for Unit I,II,III,IV).										
2.	Raj Kamal, McGraw Hil	Preeti Saxena , "Big Data Analytics, Introduction to Hadoop, Spa I Education Private Limited,2019 (for Unit V).	ark, and l	Machine-Lea	rning	", <b>'</b>	1st E	ditic	n,		
REFER	ENCES:										
1.	Bill Franks,	"Taming the Big Data Tidal Wave", 1st Edition, Wiley Reprint, 20	14.								
2.	DJ Editorial	Services, "Big Data Black Book", 1st Edition, Dreamtech Press,	2016.								

COURS On cor	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)		
CO1	outline the concepts of digital data and big data	Understanding (K2)		
CO2	interpret the big data analytics and technology landscape	Understanding (K2)		
CO3	illustrate Hadoop and map reduce framework	Understanding (K2)		
CO4	design Cassandra query expressions	Applying (K3)		
CO5	apply Spark tool to process real time data from various sources	Applying (K3)		

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	2	1											2	3
CO2	2	1	3										2	3
CO3	2	1	2	1	3	2			2				2	3
CO4	3	2	2	2	2	3			1				3	3
CO5	3	2	1	1	1	2			3				3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														

ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1	40	60					100					
CAT2	40	60					100					
CAT3	20	40	40									
ESE	20	50	30				100					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

				22E	BCL41 -	USER II	NTERF	ACE TE	CHNOL	OGIES I	LABORA	TORY					
			(Com	mon to	Compute	er Syste	ms and	Design,	Informa	tion Sys	tems & S	oftware Sys	sten	ns)			
Progra Branch	mme & ז	&	B.Sc 8 Syster	k Compu ns, Soft	uter Sys ware Sy	tems ai /stems	nd Desi	gn, Info	rmation	1	Sem.	Category	'	L.	Г Р		Credit
Prereq	uisites	5	Web P	rogram	ming La	borato	r <b>y</b>				4	PC		0	0 4		2
Pream	ble		This co time a	ourse is oplication	designeo ns.	d to impa	art the k	nowledg	je to des	sign and	impleme	nt static and	d dy	nami	c webs	ites	for real
LIST O	F EXP	ERIM	ENTS / E	EXERCIS	SES:												
1.	Desig	gn a we	eb page	of your l	oio-data	using H	TML tag	js.									
2.	Creat	te an a	attractive	webpag	je about	our dep	artment	using st	tyle shee	ets.							
3.	Apply	/ box n	nodel an	d drop-c	lown me	nus to p	orepare y	your sen	nester m	nark she	et.						
4.	Desig	gn a we	ebpage	to create	simple	interacti	ve CGP	A calcul	ator usir	ng Even	t Handling	g.					
5.	Prepa	are a v	veb appl	ication u	sing HT	TP Requ	uest and	I HTTP I	Respons	se							
6.	Deve	lop sin	nple logi	n page o	of custon	ner regis	stration I	by perfo	rming ev	/ent han	idling usir	ng GET and	I PC	OST m	nethod		
7.	Deve	lop a s	simple ca	alculator	using "N	/lodules'	in Nod	e.js									
8.	Desig	gn a we	ebpage	to mainta	ain perso	onal info	rmation	using C	RUD op	erations	in Mong	oDB					
9.	Creat	te a we	eb applic	ation us	ing com	ponents	and for	ms in Re	eact.								
10.	Prepa	are a r	eactive f	orm to n	naintain	persona	l inform	ation and	d perfori	m valida	tion using	g React.					
																	Fotal:60
REFER	RENCE	S/ MA	NUAL /	SOFTW	ARE:												
1.	Labo	ratory	Manual														
COUR On cor	SE OU npletic	TCOM on of t	IES: he cour	se, the s	students	s will be	able to	)						(	BT M Highe	app st Lo	ed evel)
CO1	devel	lop inte	eractive	web pag	es using	HTML,	CSS, Ja	avaScrip	ot.						Applyi	ng(ł	(3), (S3)
CO2	devel	lop a w	veb appl	ication to	o mainta	in inform	nation in	a datab	ase usir	ng serve	er-side sc	ripting.			Applyi Precis	ng(ł ion(	(3), (3))
CO3	apply	the co	oncepts	of React	JS to de	sign we	b applic	ations							Applyi Precis	ng(ł ion(	<3), S3)
						Марр	ing of C	Cos with	POs a	nd PSO	s						
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	Ρ	012	PSC	)1	PSO2
CO	1	3	2	1	1							2		3	2		3
CO2	2	3	2	1	1							2		3	2		3
	3 1ht 2	3 Mode	2 rate 3	1 Substar	1 tial RT-	Bloom's						2		3	2		3

					22BII	_41 - NI	ETWOF	RK SEC	URITY	LABOR	ATORY					
Progra	amme	&	B Sc.	- Inform	nation S	System	s				Sem	Category	1	т	Р	Credit
Brancl	h wisite	26	Nil	mom		ystem	5				4	PC	0	•	4	2
TICICO	1413110	,0									-	10	v	v		L
Pream	ble		To im	plement	encryp	tion tec	hniques	s and cr	yptosys	tems in	various	applications				
LIST C	OF EX	PERIN	IENTS /	EXER	CISES:											
1.	Perf	orm er	ncryptio	n, decry	ption us	sing the	substite	ution teo	chnique	s cease	er cipher	and modifie	d cea	ser	cipher	
2.	Perf	orm er	ncryptio	n, decry	ption us	sing plag	yfair cip	her sub	stitutior	n techni	que					
3.	Perf	orm er	ncryptio	n and de	ecryptio	n using	rail fen	ce trans	spositior	n techni	que					
4.	Impl	ement	Single	round D	ES											
5.	Enci	rypt a i	messag	e using	RSA Cı	ryptosys	stem									
6.	Excl	hange	cryptog	raphic k	ey secu	irely us	ing Diffi	e-Hellm	an Key	Exchar	nge algor	rithm				
7.	Enci	rypt a	messag	e using	Elgama	al Crypto	osystem	ı								
8.	Crea	ate Dig	jital sign	ature u	sing RS	A Crypt	tosyster	n								
9.	Crea	ate and	d verify ı	nessag	e digest	t using \$	SHA1 h	ash fun	ction							
10.	Crea	ating R	ule bas	ed ACL	for firev	valls										
																Total:60
REFE	RENC	ES/ M	ANUAL	/SOFT	WARE:											
1.	Labo	oratory	Manua	l / Pytho	on 3.0/ F	Packet	Tracer									
COUR	SE Ol	UTCO	MES:											E	BT Ma	oped
On co	mpleti	ion of	the cou	urse, th	e stude	ents wil	l be ab	le to						(Hi	ghest	Level)
CO1	deve	elop co	de for c	lassical	Encryp	tion Te	chnique	es to sol	ve the p	oroblem	S			A P	pplying recisio	r (K3), n (S3)
CO2	deve sign	elop cr ature s	yptosys scheme	tems by using D	applyir SS	ng symn	netric a	nd publi	c key e	ncryptic	on algorit	hms and		Aj Pi	pplying recisio	ı (K3), n (S3)
CO3	crea	ite acc	ess con	trol list t	o provio	de flexib	oility to r	make ke	ernel mo	odificatio	ons.			Aj P	pplying	ı (K3), n(S3)
	J					Маррі	ng of C	cos with	n POs a	nd PSC	Ds		1			<u><u> </u></u>
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1:	2	PSO1	PSO2
CO1	1	3	1	3											1	3
CO2	2	3	1	3											1	3
CO3	3	3	1	3												3

			:	22BCL4	13 <b>– M</b> O	BILE A	PPLIC	ATION I	DEVEL	OPMEN	IT LABC	RATORY			
			(Comm	on to Co	omputer	System	ns and [	Design,	Informa	ation Sy	stems &	Software S	ystem	s)	
Progra Branci	amme h	&	B.Sc Syste	& Comj ms, So	outer S ftware	ystems System	and De	esign, l	nforma	tion	Sem.	Category	L	ТР	Credit
Prerec	quisite	s	Java	Prograi	mming	Labora	tory				4	PC	0	0 4	2
Pream	ble		This c the de	ourse p evelopm	rovides ent of s	the kno imple a	wledge ndroid a	e in the b applicati	oasic co ons	oncepts	of andro	id programr	ning a	nd it emp	nasis on
LIST C	F EXI	PERIN	IENTS /	EXER	CISES:										
1.	Expl	ore the	e androi	d studio	o enviro	nment a	and disp	lay the	"Hello V	Vorld" N	lessage				
2.	Impl	ement	ation of	simple	activity.										
3.	Impl	ement	ation of	fragme	nts with	in the a	ctivity.								
4.	Crea	ate Inte	ents to e	establish	n conne	ction be	tween t	he Activ	/ities.						
5.	Impl	ement	ation of	dialogs	to inter	act with	the use	ers.							
6.	Desi	ign the	applica	ation wit	h differe	ent view	S								
7.	Deve	elop a	simple	calculat	or appli	cation									
8.	Crea	ate app	olication	to hand	dle imag	jes usin	g Grid v	view and	d image	switche	er.				
9.	Impl	ement	ation of	option I	menu ai	nd Cont	ext Mer	าน							
10.	Crea	ate a S	QLite D	atabase	e applic	ation.									
															Total:60
REFE	RENC	ES/ M	ANUAL	/SOFT	WARE:										
1.	Labo	oratory	Manua	I											
COUR	SE OL	JTCO	MES:											BT Ma	oped
On co	mpleti	ion of	the cou	irse, th	e stude	nts wil	l be abl	le to						(Hignest Applyin	Level)
CO1	dev	elop a	pplication	on using	g activiti	es, frag	ments a	and inte	nts.					Manipulat	ion (S2)
CO2	des	ign the	e need l	based a	pplicatio	ons usir	ng views	s, viewg	roups a	ınd imaç	ges.			Applying Precisio	g (K3), n (S3)
CO3	crea	ate ap	plicatior	ns to hai	ndle me	nus and	d data s	torage.						Applying Precisio	g (K3), on(S3)
						Маррі	ng of C	os with	POs a	nd PSC	Ds				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	P012	PSO1	PSO2
CO1	1	3	2	1	1									2	3
CO2	2	3	2	1	1									2	3
CO3 1 – Slie	3 ht 2.	3 - Mode	2 erate 3	1 – Subst	1 tantial F	ST- Bloc	om's Tar	xonomy						2	3

(C	22GCL42 PROFESSIONAL SKILLS TR ommon to BSc – Computer Systems and Design, Infor	AINING - II mation System	ns, Sofi	ware S	ystems	.)
Programme &	B.Sc & Computer Systems and Design, Information	Category	Ĺ	Т	Р	Credit
Branch	Systems, Software Systems	EC	0	0	80	2
Preamble	This subject is to enhance the employability skills and to	develop caree	r compe	tency		· ·
Prerequisites	Nil					
UNIT - I	Soft Skills - II					20
Group discussions: A of a team, why team Facing an interview personality- Communication skills interviews.	Advantages of group discussions-Structured GD- Team wo -Elements of leadership, disadvantages of a team, stages : Foundation in core subject- industry orientation / kn s-Activities before Interview, upon entering interview room,	rk: Value of tea of team forma owledge abo during the inte	im work tion- Gr ut the rview ar	in organ oup dev comp nd at the	nization elopme eany- e end M	s- Definition ent activities. professional ock
UNIT-II	Quantitative Aptitude & Logical Reasoning - II					30
and polynomial equ Probability-Statistics Logical reasoning: C in logical reasoning- Quant ba	ations-Special, equations-Inequalities-Sequence and se Data sufficiency- Geometry-Trigonometry-Heights and conditionality and grouping-Sequencing and scheduling- S sed reasoning-Flaw detection- Puzzles-Cryptarithms.	ries-Set theory d distances-Co elections-Netw	/-Permu o-ordina orks:-Co	itations ite geo odes; C	and co metry-N ubes-Ve	ombinations- Mensuration. enn diagram
	Grammar, Vocabulary, Listening, Speaking, Readir	ng & Writing				30
Grammar: Direct & I Spotting errors - Ass Structured talks - cla speaking - Role Play Team Management Reading News article Writing - Review of re	ndirect Speeches - Active & Passive voice - Vocabulary ertion and Reason - Verbal puzzle - Pair words - Logica ssroom lectures - Speaking: Telephonic conversations - v - Negotiation skills - Mock Interview - Sharing of real tin - Leadership skills - Group Discussion - Reading: Stre es - Notices & book reviews - GATE type reading compreheal time interviews/Competitive examinations	y: Technical vo I sequence of v Technical proje ne experience ss & Intonation nension - News	cabular vords - ct prese - Pair n - Effe paper re	y - Uns Listenin entations discuss ective re eading -	crambli g: Shor s - Effe ion - L ading s Writing	ng words - t extracts - ctive public _ife skills - strategies - I: Summary
Textbook:						
1. Edgar Thorp Education S	be and Showick Thorpe, "Objective English for Competitive services Pvt. Ltd, 2017.	Examination",	6th Edit	ion, Pea	arson In	dia
References:						
1. Aruna Koneru, "	Professional Speaking Skills," Oxford University Press Ind	ia, New Del <mark>h</mark> i, 2	2015.			
2. Edgar Thorpe ar	nd Showick Thorpe, "Winning at Interviews," 5th Edition, P	earson Educati	on India	,2013.		

COURS On com	SE OU	ITCOME n of the	E <b>S:</b> course, t	he studer	nts will b	e able to	)						B (Hig	F Mapped hest Leve	el)
CO1:	dev indi	elop the vidual a	soft skill nd as a t	s of learn eam	ers to su	upport th	iem wor	k efficie	ntly in a	an orgar	nization a	s an		Applying ( Precision	K3), (S3)
CO2:	solv	/e real ti	me probl	ems usinę	g numer	ical abili	ty and lo	ogical re	easonin	g				Applying ( Precision	K3), (S3)
CO3:	арр	ly Englis	sh langua	age skills f	for vario	us acad	emic an	d profes	ssional	purpose	s			Applying ( Precision	K3), (S3)
					I	Mapping	g of CO	s with F	POs an	d PSOs					
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	2	0	0	0	3	3	0	3	0	3	2		
CO2		3	2	0	0	0	3	3	0	3	0	3	2		
CO3			2					3	3		3	3	3	3	2
1 – Slig	ht, 2 –	- Modera	ate, 3 – S	ubstantial	, BT- Bl	oom's Ta	axonomy	ý							
						ASSES	SMENT	PATTE	RN - TI	HEORY					
Test / E Cate	Bloom gory*	ı's	Reme (K	mbering (1) %	U	ndersta (K2	nding 2) %	Apply (K3	ying 6) %	Analyz (K4)	zing l )%	Evaluating (K5) %	g C	reating (K6) %	Total %
(	CAT1			20		40	)	40							100
(	CAT2					50	)	50							100
(	САТЗ					50	)	50							100
	ESE														

		22BCT51 - INTERNET OF THIN	IGS					
-		(Common to Computer Systems and Design, Informatio	n Syster	ms & Software	Systems	6)		
Program Branch	nme &	B.Sc - Computer Systems and Design, Information Systems and Software Systems	Sem.	Category	L	Т	Ρ	Credit
Prerequi	isites	Computer Networks	5	PC	3	0	0	3
Preamble	e To pro applica	vide an in-depth introduction to IoT and to start off with a hations.	ands on	approach towa	rds build	ding and	d analyz	zing IoT
UNIT -I	Introd	luction to IoT:						9
Introduct Edge Co Processe	tion – IoT E omputing – es – Securit	Cosystem – IoT Reference Model – Level 1 Physical Dev Level 4 Data Accumulation – Level 5 Data Abstraction by in the IoT.	vices an n – Lev	d Controllers – el 6 Applicatic	- Level 2 n – Lev	2 Conn vel 7 C	ectivity Collabor	- Level 3 ation and
UNIT- II	Trans	ducers, Sensors and Actuators:						9
Defining Interfacin Sensor N LoRa.	Transducer ng Concepts letworks – I	s, Sensors and Actuators – Introduction to Transducers – I s to Embedded Systems – Wireless Sensor Networks and i ssues and Challenges of a Wireless Sensor Networks – Pa	ntroduct ts Techr articipati	ion to Sensors hologies – Netw ng Wireless Se	– Introd /ork Top nsing Te	uction t ologies echnolo	o Actua in Wire gies – F	tors – less RFID –
UNIT- III	loT Pr	otocols, Domains and Platform Design:						9
IoT Proto the Proto Health a	ocols – Prot ocols - Dom nd Lifestyle	ocol Classification – MQTT – XMPP – DDS – AMQP – CO ain Specific IoT: Introduction – Home Automation – Smart - IoT Platform Design methodology.	AP – Re Cities –	presentational Environment –	State Tr Retail –	ansfer Logisti	– Comp cs – Ag	arison of riculture –
UNIT- IV	loT Pł	nysical Devices and Endpoints Raspberry Pi:						9
Introduct Setup or	ion to Rasp Raspberry	berryPi – Exploring the RaspberryPi Learning Board – Ras Pi – RaspberryPi Commands – Programming RaspberryPi	spberryP with Py	i Operating Systems	stems –	Operat	ing Syst	tem
UNIT- V	loT Us	se Cases:						9
Asset Ma the M2M Smart Ci	anagement Era - The S ities.	<ul> <li>Introduction - Expected Benefits – Electronic Maintenance</li> <li>Smart Grid – Introduction - Smart Metering - Smart House</li> </ul>	ce in the - Smart I	M2M Era - Haz Energy City - C	zardous ommerc	Goods ial Build	Manage ding Aut	ement in tomation -
							Tot	al:45
TE	XT BOOK							
1. Srini UNI	ivasa K.G,S T I,II,III,IV.	iddesh G.M. and Hanumantha Raju R. "Internet of Thin	gs", Ce	ngage Learnin	g India,	Delhi,	2019	for
2. Jan Mac	Holler.,Vlas hine to the	ios Tsiatsis.,Catherine Mulligan.,Stamatis Karnouskos.,Ste Internet of Things Introduction to a New Age of Intelligence	efan Ave ", Acade	sand.,David Bo mic Press, Else	yle." Fro evier, US	om Mac SA, 201	hine-to- 4 for UI	NIT V.
RE	FERENCE	:S:						
1. Arsh	deep Bahg	a and Vijay Madisetti"Internet of Things: A Hands-on Appro	bach", U	niversities Pres	s, Hyde	rabad, 2	2020	
2. Jami 2019	il Y.Khan ar ).	nd Mehmet R.Yuce."Internet of Things (IoT) Systems and A	Applicatio	ons", Jenny Sta	Inford Pu	ublishin	g, Singa	apore,



COURSE OU	TCOME	S:	he stude	onts will	he ahle	to							BT Mappe Highest Lev	d (el)
			tornot o			recent	rondo							
CO1 Interpre	et the ba	SICS OF I	nternet c	or i ning	s and its	recent	renas.						Understandi	ng (KZ)
CO2 illustrat	e how to	initiate,	activate	e, collec	t data us	sing Trai	nsducer	s, Senso	ors and a	Actuators			Understandi	ng (K2)
CO3 summa	arize loT	protoco	ls, doma	ins and	l higher l	evel des	sign plat	forms fo	r develo	ping IoT	applicatior	ns.	Understandi	ng (K2)
CO4 develo	o prototy	pes of lo	oT using	Raspb	erry Pi.								Applying	(K3)
CO5 apply le	oT strate	gies for	core M2	M use	cases								Applying	(K3)
•					Mapping	g of COs	s with P	Os and	PSOs			•		
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2 1 2 3									3			
CO2	2	1											2	3
CO3	2	1											2	3
CO4	3	2	1	1	2	2							3	2
CO5	3	2	1	1	2	2	2						3	2
1 - Slight, 2 -	Moderat	e, 3 – S	ubstantia	al, BT- E	Bloom's T	axonom	iy							
					ASSESS	MENT I	PATTER	RN - THE	EORY					
Test / Bloor	n's	Reme	mbering	J U	ndersta	nding	Appl	ying	Analy	zing	Evaluati	ng	Creating	Total
Category	*	(К	1) %		(K2) 🤋	%	(K3	)%	(K4	) %	(K5) %	, - 0	(K6) %	%
CAT1			20		80									100
CAT2			20		80									100
CAT3			20		50			30						100
ESE			10		60		:	30						100

		22BCT52 – ARTIFICIAL INTELLIGENCE AND MAC	CHINE L	EARNING				
		(Common to Computer Systems and Design, Information	Systems	& Software Sy	vstems)			
Programme Branch	&	B.Sc – Computer Systems and Design, Information Systems and Software Systems	Sem.	Category	L	т	Ρ	Credit
Prerequisite	5	Nil	5	PC	3	0	0	3
Preamble	To foc algorit	us on fundamentals of Artificial Intelligence concepts, Mach hms.	ine learn	ing techniques	and va	rious m	nachine	e learning
UNIT– I	Artific	ial Intelligence :						9
Introduction t Problems, Pr –Problem Ch	o AI – Pr oblem Sp aracteris	oblems- Underlying Assumptions- AI Techniques – AI Appli baces and Search: Defining the problem- Production System tics – Heuristic search techniques: Generate and Test – Typ	cations - ns – Brea pes of Hi	-Tic-Tac-Toe – adth first and D Il Climbing.	Questic epth firs	on Ans <sup>.</sup> st – He	wering uristic	– Search
UNIT – II	Introd	luction to Machine Learning, Model Preparation and Eva	aluation:					9
Human Lear Learning – Is Preprocessin performance	ning –Ty sue –.M g – Selec of a mod	pes – Machine Learning – Types – Problems not to be achine Learning Activities –Types of data – Exploring stru cting a model – Training a model – Model representation and el.	solved – ucture of d interpre	- Applications data – Data d etability– Mode	– Lang quality a I Evalua	uages/ and rer ation –	tools i nediat Improv	n Machine ion – Data ⁄ing
UNIT – III	Super	vised Learning - Classification and Regression:						9
Classification Neighbor – D Regression -	n: Introd ecision 7 Assump	uction – Example – Classification model – Learning steps– Free – Random Forest- Support Vector Machines – Regress tions and Problems in Regression Analysis – Improving the	Commor sion: Intro Accurac	n classification a oduction – Exar sy.	algorith nple – S	ms– K- Simple	Neare Lineai	st
UNIT – IV	Unsu	pervised Learning-Clustering:		•				9
Introduction - Centroid-bas	- Unsupe ed Appro	ervised Learning Vs Supervised Learning – Applications – C bach – K-medoids – Hierarchical clustering – Density based	lustering methods	as a machine - DBSCAN.	learning	g task -	- K-me	ans
UNIT– V	Artific	ial Neural Network and other Learning methods						9
Introduction - Back propag	- Biologic ation – R	cal neuron – Artificial Neuron – Types of activation function - epresentation Learning – Ensemble learning algorithms – R	– Archite egulariza	ctures of NN – ation algorithm.	Learnir	ng proc	ess in	ANN–
							T	otal:45
TEXT BOOK								
1. Elaine	Rich, Ke	vin Knight and Shivashankar B. Nair, "Artificial Intelligence"	, 3rd Edi	tion, Tata McG	raw–Hil	l, 2019	for Ur	nit I.
2. Saikat (1	Dutt, Su or Units I	bramanian Chandramouli and Amit Kumar Das, "Machine L II,III,IV and V.)	earning",	, 1st Edition, 20	19 Pea	rson E	ducati	on, India,
REFERENCE	S:							
1. Deepa	k Khema	ani, "A First Course in Artificial Intelligence", 1st Edition, McC	Graw Hill	Education, Ind	ia, 2017	7.		
2. Tom N	I. Mitche	II, "Machine Learning", Indian Edition, McGraw–Hill Education	on (India)	), 2017.				
3. Steph	en Marsla nd Patter	and, "Machine Learning – An Algorithmic Perspective", 2nd na Recognition Series.2014.	Edition, (	Chapman and I	Hall/CR	C Macl	hine Le	earning

COUR	SE OUT	ГСОМЕ	S:											BT M	apped
On cor	mpletior	n of the c	course, t	he stud	ents will	be able	to							(Hignes	st Level)
CO1	describ	e the fu	ndamen	tals of a	rtificial i	intelligen	ice conc	epts an	d search	ning tech	niques			Understa	nding (K2)
CO2	explore	e the dat	a prepro	ocessing	technic	ques for	machine	learnin	g model	constru	ction and	l evaluatio	n	Understa	nding (K2)
CO3	compu	te the pe	erformar	nce of va	arious cl	assificat	ion and	regress	ion algo	rithms in	terms of	accuracy		Applyi	ng (K3)
CO4	implem	nent vari	ous data	a cluster	ing algo	orithms to	o cluster	the give	en datas	et				Applyi	ng (K3)
CO5	apply a	artificial r	neural n	etwork r	nodel fo	or real life	e probler	ns and o	describe	other v	arious lea	arning tech	iniques	Applyi	ng (K3)
	Mapping of COs with POs and PSOs														
COs/	Os/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02														
С	01	2	2	2	2					1	2	1	1	2	3
C	02	2	1	1	1					1	2	1	1	2	3
C	O3	3	2	1	1					2	2	1	2	2	3
С	04	3	2	1	1					2	2	1	2	2	3
С	O5	3	2	1	1					2	2	1	2	2	3
1 – Slig	ght, 2 –	Moderat	ie, 3 – S	ubstanti	al, BT–	Bloom's <sup>-</sup>	Taxonom	ıy				·			
						ASSES	SMENT	PATTE	RN – Tł	IEORY					
Test	/ Bloon	ı's	Reme	emberin	g	Underst	tandin	Appl	ying	Analy	/zing	Evaluati	ng	Creating	Total
- Ca	liegory			(KI) %	D	9(1	<b>~</b> 2) %	(กง	) 70	(174)	) 70	(N3) 7	0	(NO) %	%
	CAT1		4	10		60									100
	CAT2		2	20		50		30	)						100
	CAT3		2	20		30		50	)						100
	ESE		1	0		50		40	)						100

				22BC	L51 INTI	ERNET (	OF THING	S LABO	RATOR	Y				
		(Com	mon to C	ompute	r System	s and De	esign, Inf	ormation	Systen	ns & Sof	tware Sy	stems)		
Progran Branch	nme&	B.Sc – C Systems	Compute s and So	r System ftware S	is and De ystems	esign, In	formatio	<sup>n</sup> Sem.	Cate	gory	L	т	Р	Credit
Prerequ	lisites	Python	Program	nming				5	Р	С	0	0	4	2
		1												
Preamb	le	To provi sensor c	de familia lata.	arization	with Ardu	ino/Rasb	erry Pi ar	nd develop	oment of	simple p	oython ap	plications	s to manip	oulate
List of I	Exercise	es / Exper	iments:											
1. A	Arduino b	ased LEC	) turn on	for 1 sec	ond after	every 2 s	seconds.							
2. A	Arduino b	ased LEC	on/off u	sing mov	ement se	nsor								
3. A	Arduino b	ased tem	perature	and hum	idity moni	itoring								
4. F	Raspberr	y pi baseo	LED On	/Off using	g push bu	utton								
5. F	Raspberr	y pi baseo	d distance	e measur	ing using	ultrasoni	ic sensor							
6. F	Raspberr	y pi baseo	d weather	monitori	ng									
7. F	Raspberr	y pi baseo	d rain fall	detectior	using rai	in sensoi	r							
8. F	Raspberr	y pi baseo	d obstacle	e detectio	n using II	R sensor								
9. F	Raspberr	y pi baseo	l object c	olor dete	ction usin	ig camera	a sensor							
10. F	Raspberr	y pi basec	turn LE	ON/OF	F when "1	"'0' is rec	eived fror	n Smartpl	none usi	ng Blueto	ooth Low	Energy 3	.0	
														Total:60
REF	ERENC	ES/MAN	NUAL/SO	OFTWA	RE:									
1	Lab	oratory I	Manual/F	Python										
COURS	SE OUTC	OMES:									DTI	Mannad	(Highost	
On c	completio	n of the c	ourse, the	e student	s will be a	able to					ы	nappeu	Ingliest	Level)
0	1	dovolo	n annlica	tions for	handling		(omont/H	umidity co	ncor dat			Applying	g (K3),	
	' I	uevelo	p applica		nanunny		ement/11	unituity se	nsor uai	.a.		Manipula	tion(S2)	
со	2	c	design ap	plications	s using Ul	ltrasonic/	Weather/	Rain sens	ors.			Applying Manipula	g (K3), tion(S2)	
со	3	create a	applicatio	ns to han	dle data ı	received	through II	R/Camera	/Bluetoo	oth.		Applying	(K3),	
					Маррі	ng of CC	)s with P	Os and P	SOs			TIECISIC	/ii (00)	
COs/P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	POS	POQ	PO10	P011	PO12	PSO1	PSO2
Os	101	1.02	105	104	105	100	10/	100	103	1010	1011	1012	1001	1 002
CO1	2	1											2	3
CO2	2	1											2	3
CO3	3	2	1	1									2	3
			1 -	- Slight, 2	2 – Mode	erate, 3 -	- Substar	ntial, BT-	Bloom"s	Taxono	my			

					22E	BCL52 -	MACH	NE LEA	RNING	LABOR	ATORY	,					
		(C	commor	n to Cor	nputer	System	s and D	esign, l	nformat	ion Syst	ems &	Software \$	Systen	ns)			
Pro	grammo Branch	e &	B.Sc – ( System	Comput s and S	ter Syst oftware	ems an Syster	d Desig ns	n, Infor	mation	Sem	. <b>C</b>	ategory	L	т	Р	С	redit
Pre	erequisit	tes	Python	Progra	mming					5		РС	0	0	4		2
F	Preamble	e	This co by apply	urse enł ying Ma	nances s chine Le	skill in M earning a	achine I algorithn	_earning ns.	) platforr	n and en	nphasiz	es on deve	loping	real t	ime app	licatio	ons
List o	of Exer	cises	/ Expe	erimer	nts:												
1.	Study o	f IDE ai	nd Cloud	d platfor	m Spyde	er, Jupyt	er Notel	book an	d Data r	epositori	es UCI	and Kaggle	)				
2.	Demons numeric	strate p cal data	reproces	ssing me	ethods a	nd calcu	ulation o	f mean,	median	, varianco	e and st	andard dev	viation	of the	e given		
3.	Demons	strate p	lotting te	chnique	es and e	xplore th	ne relatio	onship b	etween	variables	s of nun	nerical data	l				
4.	Implem	ent k–N	IN algori	thm for	the give	n data.											
5.	Write a	prograr	n to find	the attr	ibute wit	h maxin	num info	rmation	gain for	the give	n data						
6.	Apply s	Apply support vector machines algorithm															
7.	Implem	ppiy support vector machines algorithm nplement simple Linear regression algorithm															
8.	Implem	ent k-m	neans cl	ustering	algorith	m for th	e given (	data									
9.	Explore	various	s activat	ion func	tions us	ed in AN	IN										
10.	Implem	ent mul	ti–layer /	Artificial	Neural	Network											
																Tota	al: 60
REFE	RENCES	/MANU	JAL/SOF	TWAR	E:												
1	Jupyter	Notebo	ook/Spyc	der/ Goo	gle Cola	ab Cloud	d platfori	m/Scikit-	-learn p	ackage							
COUR On cor	SE OUT	COME: of the c	<b>S:</b> course, t	he stude	ents will	be able	to								BT M (Highes	appe st Lev	d /el)
CO1	perform	n variou	us data p	orocessi	ng and p	olotting t	echniqu	es							Applyir Imitatio	ig (K3 on (S	3), 1)
CO2	apply o	classific	ation an	d cluste	ring algo	orithms o	on the gi	iven data	a set						Applyir Precisi	ig (K3 on (S	3), 3)
CO3	develo	p a real	l time ap	plication	n using a	artificial	neural n	etwork.							Applyir Precisi	ig (K3 on(S	3), 3)
						Марр	oing of	COs wit	h POs a	nPSOs							
COs/I	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO	12	PSO1	PS	302
C	O1	3	2	1	1	2						3	2		2		3
C	02	3	2	1	1	2						3	2		2		3
C	03	3	2	1	1	3						3	2		2		3
1 – Sli	ght, 2 – I	Moderat	te, 3 – S	ubstanti	al, BT–	Bloom's	Taxono	my									

			22BCE01 CLOUD C	OMPUTING					
		(	Common to Computer Systems and Design, Info	rmation Syste	ms & Software	Syster	ns)		
Prog Bran	ramme& ch	8	B.Sc – Cputer Systems and Design, Informatio Systems and Software Systems	n Sem.	Category	L	Т	Р	Credit
Prere	quisite	S	Computer Networks	5	PE	3	0	0	3
Prear	mble	This co foundat	urse covers comprehensive and fundamental conce tions and technologies related to the applications ar	epts of distribute ad services of cl	ed computing ar oud computing.	nd virtua	lizatior	n. It impa	arts the
Unit -	·I	Distrib	uted System Models and Enabling Technologies						9
Scala Comp	ble Con outing –	nputing c Software	over the Internet – Technologies for Network Based Environments for Distributed Systems and Clouds	Systems – Sys .– Performance	tem Models for , Security, and	Distribu Energy	ted and Efficien	d Cloud icy.	
Unit -	·II	Virtual	Machines and Virtualization of Clusters and Dat	a Centers					9
Imple device	mentatio es – Virt	on levels tual Clus	of Virtualization – Virtualization Structures – Tools ters and Resource Management – Virtualization for	and Mechanism Data Center Au	ns – Virtualizatio utomation-Case	on of CF Study.	PU, Mei	mory, I/(	C
Unit -	· III	Cloud I	Platform Architecture over Virtualized Data Cent	ers:					9
Cloud Stora Mana	l compu ge Clou gement	ting and ds – Pub . Case si	Service models – Data Center Design and Intercon lic Cloud Platforms - Google App Engine – AWS – tudy : Configuring Compute and Storage Services	nection Networ Microsoft Windo	ks – Architectur ows Azure – Inte	al Desig er cloud	gn of Co Resou	ompute Irce	and
Unit -	١V	Cloud I	Programming and Software Environments:						9
Featu Engin	ires of C ie– Prog	loud and	d Grid Platforms – Parallel and Distributed Programi g on Amazon AWS and Microsoft Azure– Emerging	ming Paradigms Cloud Software	s – Programmin Environments:	g Supp Open S	ort of G Stack.	oogle A	рр
Unit -	٠V	Ubiquit	ous Clouds and the Internet of Things:						9
Cloud the In	l Trends ternet o	in supp f Things	orting Ubiquitous Computing – Performance of Distr – Innovative Applications of the Internet of Things.	ibuted Systems	and the Cloud	– Enab	ling tec	hnologie	es for
								٦	Fotal:45
TEX	ст вос	DK:							
1.	Kai Hw Things'	ang, Geo ', 1st Edi	offrey C Fox & Jack G Dongarra, "Distributed and C tion, Morgan Kauffmann, 2021.	loud Computing	, From Parallel	Proces	sing to	the Inte	rnet of
REF	EREN	CES:							
1.	Daniel	Kirsch, J	udith Hurwitz, "Cloud Computing", 2nd Edition, Wile	ey, 2020.					
2.	Marine	scu, "Clo	ud Computing : Theory And Practice" , 2nd Edition,	Elsevier India,	2020				

COUR On cor	SE OUT(	COMES	: ourse, th	e studer	nts will I	be able to	C							BT Ma (Highest	pped : Level)						
CO1	explain t	he conc	epts, ch	aracteris	stics an	d benefit	s of Dist	tributed	System	Models				Understar	nding (K2)						
CO2	summar	ize the c	lifferent	virtualiza	ation te	chnologi	es							Understar	nding (K2)						
CO3	experim	ent the	various	cloud co	mputin	g service	models	5						Applyir	ng (K3)						
CO4	demons	trate the	use of o	cloud pla	atforms	and soft	ware en	vironme	nts					Applyir	ng (K3)						
CO5	explain t	he cloud	d trends	that sup	ports u	biquitous	s clouds	and Inte	ernet of	Things				Understar	nding (K2)						
	Mapping of COs with POs and PSOs																				
COs/F	POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2						
С	O1	2	1											3 2							
С	02	2	1											3	2						
С	O3	3	2	1	1									2	3						
С	O4	3	2	1	1									2	3						
С	O5	2	1											3	2						
1 – Slię	ght, 2 – N	loderate	e, 3 – Su	ubstantia	al, BT-	Bloom's	Taxono	my													
						ASSESS	SMENT	PATTEI	RN - TH	EORY											
Test	/ Bloom'	S	Reme	mbering	g U	ndersta	nding	Appl	ying	Analy	zing	Evaluati	ng	Creating	Total						
Ca	tegory*		(K	1) %		(K2) %	6	(K3	)%	(K4)	)%	(K5) %	6	(K6) %	%						
CA	T1			20		80									100						
CA	T2			20		60			20						100						
CA	CAT3 20 60 20 100																				
ES	SE			20		60			20						100						

## 22BIE01 CYBER FORENSICS AND SECURITY MANAGEMENT

Prog Brar	gramme8 nch	k .	B.Sc. Information Systems	Sem.	Category	L	Т	Р	Credit
Prer	equisites	6	Nil	5	PE	3	0	0	3
Prea	mble	To impa	rt the knowledge of fundamental principles and techniques fo	or digita	forensics inve	stigatior	n and se	curity	
	r 1	Digital	Ineni. Foronaioa Investigationa						0
	-		vitel Formation Defension and leventing times.	Divital	Essentian Inc.		A.	0	9
Com Tech Privi	puter Crir puter Crir Investig	g the Di me - An ations - stigation	gital Forensics Profession and Investigations: Preparing a Overview of a Company Policy Violation - Taking a Systemat Employee Termination Cases - Internet Abuse Investigati s - Industrial Espionage Investigations - Conducting an Investigations	ic Appr ions - tigation	Forensics inv oach – Procedu E-mail Abuse	ures for Investig	on - Ar Private- ations -	-Sector - Attorr	High- High- ley-Clien
UNI	Г-II	Data Ac	quisition:						9
Data for in Imag other	Acquisition nage acq er Lite – ' Forensic	on: Unde uisitions Validatin s Acquis	<ul> <li>Prstanding storage formats for digital evidence – Determining – Using Acquisition tools - Mini-WinFE Boot CDs and USB g Data Acquisitions– Performing RAID Data Acquisitions – Usition tools.</li> </ul>	the be Drives sing Re	st acquisition n - Capturing a mote Network	nethod - n Image Acquisi	e with A tion tool	gency p accessE Is – Usi	Danning DataFTK ng
	Г -III	Process	sing Crime and Incident Scenes:						9
Proc Evid UNI Curr Hard	essing Cr essing La ence at th <b>Γ-IV</b> ent Digita	aw Enfo <u>ne Scene</u> Digital I al Foren ols –Vali	recement Crime Scenes – Preparing for a Search –Securing –Storing Digital Evidence – Obtaining a Digital Hash –Revie Forensic Tools, Analysis and Validation: sics Tools: Evaluating Digital Forensics Tool Needs - Dig dating and Testing Forensics Software, Digital Forensics A	g a Dig wing a gital Fc nalvsis	rensics Softwa and Validation	are Too	Scene Scene Is – Di	-Seizin gital Fo	ng Digita
and	Analysis -	- Validat	ing Forensic Data –Addressing Data-Hiding Techniques.				g -		
	Г- V	Security	/ Management:						9
E-ma E-ma Appl Impo	ail and So ail - Inve ying Digit ortance of	ocial Mee stigating al Foren Reports	dia Investigations: Exploring the Role of E-mail in Investigati E-mail Crimes and Violations - Understanding E-mail Se sics Methods to Social Media Communications. Report Writir - Guidelines for Writing Reports - Generating Report Finding	ions - E ervers - ng for H gs with I	xploring the Re Using Specia igh-Tech Inves Forensics Softv	oles of t lized E- tigation: vare To	the Clie -mail Fo s: Unde ols.	nt and prensics rstandi	Server in s Tools · ng the
									Total:45
TEX	т воок	K:							
1.	NelsonBi Boston, 2	ill, Phillip 2019.	osAmelia and SteuartChris, "Guide toComputerForensics a	and Inv	estigations", 6	th Editi	on, Cer	ngage	Learning
REF	EREN	CES:							
1.	Dejey an	d Murug	an S, "Cyber Forensics", 1st Edition, Oxford University Press	, India,	2018.				
2.	Omar Sa	ntos, "D	eveloping Cybersecurity Programs and Policies", 3rd Edition,	Pearso	on Education, 2	018.			

COUR	SE OUT	COMES	:											BT Ma	pped
On co	mpletion	of the co	ourse, th	ne stude	nts will	be able t	0							(Highest	Level)
CO1	explain a	a digital i	forensic	investig	ation w	ith a sys	tematic a	approac	h					Understan	ding (K2)
CO2	carry ou	t acquisi	tion of c	lata usin	ig variou	us tools								Applyin	g (K3)
CO3	practice	the seiz	ure of d	igital evi	dence i	n a crime	e scene							Applyin	g (K3)
CO4	demons	trate the	use of f	orensic	tools in	forensic	examina	ation						Applyin	g (K3)
CO5	present	the inve	stigatior	in emai	il and cl	oud fore	nsics an	d use fo	prensic to	ools to g	enerate re	eports		Applyin	g (K3)
	Mapping of COs with POs and PSOs														
COs	s/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
C	CO1         3         1         1         1													1	
C	:02	3	2	3		2								2	
C	:03	3	2	1	2	2								2	
C	04	3	2	2	3	3								3	1
C	05	3	2	2	3	3								3	1
1–Slig	ht,2–Moo	derate, 3	–Substa	antial, B	T- Bloor	n"sTaxo	nomy								
						ASSE	SSMEN	Τ ΡΑΤΤ	ERN - 1	HEORY	,				
Te	st / Bloo	m's	Reme	emberin	ig l	Indersta	anding	Ар	plying	Ana	lyzing	Evalua	ting	Creating	Total
(	Category	/*	(	<b>&lt;</b> 1) %		(K2)	%	(K	(3) %	(K	4) %	(K5)	%	(K6) %	%
	CAT1 20 60 20													100	
	CAT2			20		40	)		40						100
	CAT3 20 40 40												100		
	ESE			20		40	)		40						100

### 22BIE02 MOBILE COMMUNICATION

Programme & Branch	B.Sc. Information Systems	Sem.	Category	L	т	Р	Credit
Prerequisites	Computer Networks	5	PE	3	0	0	3

Pream	ble	This course focuses on the communication technology used in mobile systems. It also covers the effect of mobility	on
		mobile applications and security.	
UNIT -	I	Introduction:	9
Introdu Mobile Compu Existing	ction: 1 Comp Iting - 1 g Appli	Mobile Computing - Dialogue Control - Networks - Middleware and Gateways - Application and Services - Dev uting Applications - Security - Standards - Standard Bodies - Mobile Computing Architecture : Architecture for Ihree-tier Architecture - Design Consideration for Mobile Computing - Mobile Computing through Internet - Making cations Mobile-Enabled.	eloping Mobile
UNIT -		Telecommunications systems:	9
Mobile Emergi	Compu ng Tec	uting through Telephony : Evolution of Technology - Multiple Access Procedures - Satellite Communication System hnologies: Introduction - Bluetooth - RFID - WIMAX - Mobile IP - IPV6 - Java Card	6-
UNIT-		GSM and SMS:	9
Global Addres Service SMS -	Systen ses an e - Auth Access	n for Mobile Communications - GSM Architecture - GSM Entities - Call Routing in GSM - PLMN interface GSM Id Identifiers - Network aspects in GSM - Mobility Management - GSM Frequency Allocation - Personal Communic nentication and Security - Short Message Service: Mobile Computing over SMS - SMS - Value Added Services thro sing the SMS Bearer.	ations ugh
UNIT-	V	GPRS and WAP:	9
Genera Operat Rates f	al Pack ions - [ for GSN	et Radio Service: Introduction - GPRS and Packet Data Network - GPRS Network Architecture - GPRS Network Data Services in GPRS - Applications for GPRS - Limitations of GPRS - Billing and Charging in GPRS - Enhancing M Evolution - Wireless Application Protocol: Introduction - WAP- MMS - GPRS Applications.	Data
UNIT-	V	Wireless Technology:	9
CDMA Mobility Wireles	and 30 y in Wii ss Acce	G: Spread- Spectrum Technology - Wireless LAN: Advantages - IEEE802.11 Standards - Wireless LAN Architecture reless LAN - Deploying in Wireless LAN - Mobile Adhoc Networks and Sensor Networks - Wireless LAN Security - ess in Vehicular Environment - Wireless Local Loop - HiperLAN - WIFI vs 3G.	9 -
		т	otal:45
TEXT	BOOK	<:	
1.	Asoke Editior	• K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing Technology, Applications and Service Creation" n, McGraw-Hill Education , 2018.	, 2nd
REFE	REN	CES:	
1.	Schille	er J, "Mobile Communication", 2nd Edition, Pearson Education, India, 2019.	
2.	Raj Ka	amal, "Mobile Computing", 3rd Edition, Oxford University Press Inc., 2019.	



COUR	SE OUT	COMES	6:											BT Ma	pped
On cor	mpletion	of the c	ourse, tl	ne stude	ents will	be able	to							(Highest	Level)
CO1	interpret	the wo	rking pr	inciple o	f teleco	mmunica	ation sys	stems.						Understan	ding (K2)
CO2	Outline t	the eme	erging te	lecomm	unicatio	on techno	ologies.							Understan	ding (K2)
CO3	demons	trate the	e archite	ecture ar	nd work	ing of GS	SM and S	SMS se	rvices					Understan	ding (K2)
CO4	Summa	rize the	compor	nents an	d their o	operation	is of GP	RS and	WAP pr	otocol.				Understand	ding (K2)
CO5	Explain	the wire	less LA	N techn	ology a	nd its fea	itures.							Applyin	g (K3)
	Mapping of COs with POs and PSOs														
COs	s/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C	CO1 3 2 1 1												2	3	
С	02	2	1											1	3
С	:03	3	2	1	1									2	3
C	04	2	1											2	3
C	:05	2	1											2	3
1 – Slig	ght, 2 – N	loderate	e, 3 – Si	ubstantia	I, BT- E	Bloom's Ta	axonom	у							
					AS	SESSME	INT PA	TTERN	- THEO	RY					
Tes	st /Bloon	n's	Rem	emberir	1	Underst	andin	Арр	olying	Anal	yzing	Evalua	ting	Creating	Total
Category* g (K1) % g (K2) % (K3) % (K4) % (K5) %											%	(K6) %	%		
CA	<b>T</b> 1			30		70									100
CA	T2			40		60									100
CA	<b>T</b> 3			40		50			10						100
E	SE			40		50			10						100

		22BCE04 OBJECT ORIENTED ANALYSIS	AND D	ESIGN				
		(Common to Computer Systems and Design, Information	n Syster	ns & Software	System	s)		
Programme Branch	&	B.Sc - Computer Systems and Design, Information Systems and Software Systems	Sem.	Category	L	т	Ρ	Credit
Prerequisite	s	Nil	5	PE	3	0	0	3
Preamble	To foc UML.	us on analysis and design of objects and classes based on	object c	riented technic	ques and	d metho	dologie	s using
UNIT - I	Introd	uction:						9
An overview Polymorphisr oriented syst	– Objeo n - Rel em dev	t basics: Object state and properties – Behavior – Methods ationships – Associations – Aggregations- Identity – Dyn elopment life cycle.	s – Mes amic bi	sages – Inform nding – Persis	nation h stence -	iding – 0 - Meta	Class hi classes	erarchy – – Object
UNIT - II	Metho	dologies and UML:						9
Introduction language: St diagram – Ac Case study.	<ul> <li>Surve atic and tivity dia</li> </ul>	ey – Rumbaugh, Booch, Jacobson methods – Patterns - d Dynamic models – UML diagrams – Class diagram – Us agram - Component diagram – Deployment diagram – Dyna	Frame se case amic mo	works – Unifie diagrams – Ir odelling – Mode	d Appro nteractio el organi	bach - l on diagra zation -	Jnified am – S - Extens	modelling tate chart sibility –
UNIT- III	Objec	t Oriented Analysis:						9
Identifying Us Classification Identifying at	se case 1 – Iden <sup>:</sup> tributes	<ul> <li>Business object analysis – Use case driven object oriente ifying object, relationships, attributes, methods: Association and methods – Object responsibility – construction of class</li> </ul>	ed analy ns - Sup s diagrar	vsis – Use case er-sub class – n for generaliza	e model A part c ation, ag	– Docu of relatio ggregati	mentati nships on.	on – -
UNIT- IV	Objec	t Oriented Design:						9
Introduction - Philosophy - Packages an	Desigr UML ob d Mana	Process - Design Axioms – Corollaries – Design patterns - ject constraint language – Process - Class Visibility – Refin ging classes – Case study.	- Desigr ning Attr	ing Classes: C butes – Desigr	bject or hing Me	iented c thods ar	design nd Proto	ocols –
UNIT- V	View	Layer:						9
Introduction - of a view laye	- UI des er interfa	ign as a creative process – Designing view layer classes – ace – Prototyping the UI – Case Study.	Macro-	evel process -	Micro-le	evel pro	cess – F	ourpose
								Total:45
TEXT BOOK	:							
1 Bahram	i Ali, "O	bject Oriented Systems Development", 1st Edition, Tata Mo	Graw H	ill Publishing C	Compan	y, New I	Delhi, 2	017
REFERENCE	S:							
1 Martin F	owler,	"UML Distilled: A Brief Guide to the Standard Object Modeli	ing Lang	juage" , 3rd Ed	lition, Pe	earson E	Educatio	on, 2018
2 Bhuvan	Unhelk	ar, "Software Engineering with UMI", 1st Edition, CRC Pre-	ss. 2018	}				

COURSE OU	TCOMES	S: course t	he stude	onts will	he able	to						(H	BT Mapped	d el)						
CO1 interpre	et the bas	sics of o	bject ori	ented c	oncepts	and the	system	develop	ment life	ecycle		L L	Inderstandir	ng (K2)						
CO2 Implem	ent UML	diagra	ns in dif	ferent a	policatio	ns	,			,			Applving (	K3)						
CO3 demon	strate ob	iect orie	nted an	alvsis b	/ identify	/ing use	cases (	lasses a	and their	relations	hins		Applying (	K3)						
			system		avione	corollari	<u></u>				···po		Applying	(K3)						
			system	s using	axioms,	corollari	63					<u> </u>		(1(0)						
CO5 illustrat	e user in	iterface	design i	n view la	ayer	( 0 0			<b>DOO</b>				Inderstandir	ng (K2)						
				N	lapping	g of COs	s with P	Os and	PSOs	1		1	-							
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2						
CO1	2	1	1	2	2								2	3						
CO2	3	2	1	1	3	1							2 3							
CO3	3	2	1	1	2								2	3						
CO4	3	2	1	1	2	1							2	3						
CO5	2	1	1	1									1	3						
1 - Slight, 2 -	Moderat	e, 3 – S	ubstantia	al, BT- E	Bloom's T	axonom	у													
					ASSES	SMENT	PATT	ERN - TI	HEORY											
Test / Bloor	n's *	Rem	emberi	n l	Jnderst	andin 2) %	App	olyin K3)	Ana	lyzin K4) %	Evalua g(K5	tin )%	Creating	Total						
Category			<b>J</b> ( <b>I</b> ( <b>I</b> ) /0		9(14	_, /0	%	110)	90	(4) /0	9(110)	, /0	(110) /0	%						
CAT1			10		60			30						100						
CAT2			10		50			40						100						
CAT3	CAT3 10 60 30 100																			
ESE			10		50	)		40						100						

			22BIE03 SOCIAL WEE	3 MINING						
Progra Branc	amme& h	E	3.Sc – Information Systems	Sen	۱.	Category	L	т	Р	Credit
Prerec	quisites	[	Data Warehousing and Data Mining	5		PE	3	0	0	3
Pream	ible Th	is cour	se emphasis on web based social media mining teo	chniques and	l its	applications.				
Unit -	I Int	roduc	tion							9
Social Conne	Media Min ctivity in G	ing - C raphs ·	Challenges for Mining. Graph Essentials: Graph Bas – Special Graphs.	ics – Graph	Rep	presentation -	Types	of Gra	phs –	
Unit -	ll Gr	aph Al	Igorithms and Network Measures							9
Graph	Algorithms	s and it	ts types. Centrality – Transitivity and Reciprocity – E	Balance and	Sta	atus – Similarit	y.			
Unit -	III Da	ta Min	ing Essentials and Community Analysis							9
Data – Comm CaseS	Data Prep unity Dete tudy : K-m	orocess ction – eans c	sing – Data Mining Algorithms – Supervised Learnir Community Evolution – Community Evaluation. clustering, KNN (k-nearest neighbours) ,Support-veo	ng – Unsupe ctor machine	rvis s.	ed Learning.	Commu	nity An	alysis:	
Unit -	IV Int	eractio	ons in Social Media							9
Herd E Homor Case S	Behavior – ohily. Study: Mini	Inform ng Fac	ation Cascades – Diffusion of Innovations – Epiden	nics. Applica	tion	s: Measuring	Assorta	tivity –	Influen	ce –
Unit -	V Re	comm	endation in Social Media							9
Challe recom	nges – Cla mendation	ssical s. Beh	Recommendation Algorithms – Using Social Conte aviour Analytics: Individual behaviour – Collective b	xt – Evaluati ehaviour. Ca	ng I ase	Recommenda study: Mining	tions –E Mailbo	Evaluat xes.	ing Ran	king of
									Tota	ıl: 45
техт	BOOK:									
1.	Reza Zaf Press, 20	arani, I 14.	Mohammad Ali Abbasi and Huan Liu, "Social Media	Mining- An	Intr	oduction", 1st	Edition	, Camb	oridge U	niversity
REFE	RENCES:									
1.	Matthew	A. Rus	sell, Mikhail Klassen,"Mining the Social Web",3rd E	dition,O'Reil	y N	/ledia, 2019.				
2.	Gage Ign	atow a	nd Rada F. Mihalcea, "Text Mining: A Guidebook fo	or the Social	Sci	ences", 1st Ec	dition, S	age Pu	ublicatio	ns, 2017

COUR On cor	SE OUT	COMES of the c	<b>S:</b> ourse, t	he stude	ents will	be able	to							BT Map (Highest	oped Level)
CO1	explain	the bas	ic conce	epts of se	ocial me	dia mini	ng and v	/arious g	graph					Understand	ling (K2)
CO2	summa	rize the	various	types of	graph a	algorithm	ns and n	etwork r	neasure	s used f	or mining			Applying	j (K3)
CO3	apply th	ne data i	mining a	llgorithm	s for so	cial med	lia minin	g						Applying	g (K3)
CO4	experin	nent with	the var	ious inte	eraction	s in socia	al media	with its	applicat	ions				Understand	ling (K2)
CO5	Identify	the vari	ous reco	ommenc	lations i	n social	media							Applying	g (K3)
	Mapping of COs with POs and PSOs														
CO	s/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO1	2 PSO1	PSO2
C	01	2	1											2	3
C	02	3	2	1	1									2	3
C	O3	3	2	1	1									2	3
C	04	2	1											2	3
С	O5	3	2	1	1									2	3
1 – Slig	ght, 2 –	Modera	te, 3 – S	Substant	ial, BT-	Bloom's	Taxono	omy				•			
					Α	SSESSI	MENT P	ATTER	N – THE	ORY					
Te:	st /Bloo Categor	m's y*	Rem g	emberir J(K1) %	n   l	Jndersta g(K2	andin 2) %	App (K	olying 3) %	Ana (K	lyzing 4) %	Evalua (K5)	ting %	Creating (K6) %	Total %
CA	CAT1 15 50 35 100											100			
CA	T2			15		45			40		-	-		-	100
CA	AT3			15		45			40		-	-		-	100
E	SE			15		45			40		-	-		-	100

#### 22BIE04 INTERNET TECHNOLOGIES **B.Sc - Information Systems Programme &** Р Sem. Category ŤΠ Credit Branch 3 6 PE 3 Ó 0 Prerequisites Computer Networks To explore the fundamental knowledge about recent Internet technologies and to create Java applications Preamble Unit - I Basic Networking: 9 Java and the Net – Java Networking classes and Interfaces – Getting Network Interfaces- URL –URL Connection – HttpURLConnection– Proxy – ProxySelector – Socket Programming: Introduction – Client/server Programs – Sockets – TCP Sockets – UDP sockets. Unit - II Servlet and Java Server Pages 9 Server-side Java – Advantages Over Applets – Servlet Alternatives – Server Strengths – Servlet Architecture – Servlet Architecture Servlet Life Cycle – GenericServlet – HttpServlet – First Servlet – Passing Parameters to Servlets – Retrieving Parameters – Java Server Pages: Introduction and Marketplace – JSP and HTTP – JSP Engines –How JSP Works – JSP and Servlet – Anatomy of a JSP Page JSP Syntax JSP Components Unit - III JSP and Java Database Connectivity (JDBC) 9 JSP: Beans – Session Tracking – User Passing Control and Data Between Pages – Sharing Session and Application Data - JDBC Introduction – JDBC Drivers – JDBC Architecture – JDBC Classes and Interfaces – Basic Steps – Loading a Driver – Making a Connection - Execute SQL Statement - SQL Statements - Retrieving Result - Getting Database Information - Scrollable and Updatable ResultSet Result Set Metadata. Unit - IV Hibernate 9 Introduction - Installing Hibernate - Basic Steps - Writing POJO Class - Creating a Table - Writing a Hibernate Application - Compiling and Running Application - Using Annotation - Environment Setup for Hibernate Annotation - Book Application using Annotation -Function of Different Annotations – Object Life Cycle – Hibernate Query Language- Native SQL Query – Named Queries – DDL – Generator Class **Hibernate Tools** Unit - V J2EE 9 Overview of J2EE – Introduction to JavaBeans – Bean builder – Advantages of JavaBeans – BDK introspection – Properties – BeanInfo Interface – Persistence – Customizer – JavaBeans API - EJB – Introduction to Struts Framework. Total: 45 TEXT BOOK: Uttam K Roy, "Advanced Java Programming", 1st Edition, Oxford University Press, 2017. REFERENCES: 1 Schildt Herbert, "Java: The Complete Reference", 11<sup>th</sup>Edition, McGraw Hill Education, New Delhi, 2018. 2 Paul Deitel, Harvey Deitel, "Java How to Program", 11th Edition, Pearson Education, 2018.

COUR On cor	SE OUTO	COMES:	urse the	e studer	nts will h	e able to								BT Map (Highest	ped _evel)
CO1		on funda	montals	of basi		rking and	socket n	ogram	ning					Understan	ding (K2)
001							Socket pi	ogrami	mig					Analysian	
CO2	createse	rviets to	r real wo	orid app	lications	5								Applying	(K3)
CO3	creating	java ser	ver page	es and e	establis	ning datab	ase conr	nectivity						Applying	(K3)
CO4	understa	Inding th	e conce	pts and	tools of	f hibernate	Э							Understand	ing (K2)
CO5	understa	inding th	ie java b	eans Al	PI and s	structs frar	nework							Understand	ing (K2)
	Mapping of COs with POs and PSOs														
COs	s/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	2 PSO1	PSO2
С	:01	2	1											2	3
C	:02	3	2	1	1									2	3
С	03	3	2	1	1									2	3
С	04	2	1											2	3
С	05	2	1											2	3
1 – Slig	ght, 2 – N	loderate	, 3 – Sul	bstantia	l, BT- B	loom's Tax	xonomy								
						ASS	ESSMEN	Τ ΡΑΤΊ	FERN - T	HEORY					
Te	st / Bloo	m's	Rem	emberi	ng	Underst	anding	Apply	ying (K3)	Analy	zing (K4)	Evaluatin	ng (K5)	Creating (K	6) Total
(	Category	<b>/*</b>	(	K1) %		(K2)	%		%		%	%		%	%
	CAT1			20		50	)		30						100
	CAT2			15		35	5		50						100
	CAT3			15		85	5								100
	ESE			15		50	)		35						100
		22BCE07 DATA SCIENC	E												
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		(Common to Computer Systems and Design, Informatio	n Systen	ns & Software	Systems	.)									
Programme Branch	&	B.Sc - Computer Systems and Design, Information Systems and Software Systems	Sem.	Category	L	т	Р	Credit							
Prerequisite	S	Nil	6	PE	3	0	0	3							
Preamble	This co	ourse provides an introduction to data science, its process	with focu	is on big data a	and text	mining.									
UNIT - I	Introd	uction:						9							
Benefits of D example of H and Transfor	ata Scie Iadoop ming Da	ence – Facets of Data – Data Science Process –Big Data - The Data Science Process: Overview – Defining Rese ata – Exploratory Data Analysis – Building Models – Prese	Ecosyst arch Goa nting Fin	em and Data S als – Retrieving dings and Build	Science- g Data - ding App	An Intro - Clean lication:	oductor sing, In s.	y working itegrating,							
UNIT - II	Machi	ne learning and handling big data:						9							
Introduction Data – Gene	o Machi ral Tech	ne Learning and its Applications – The Modeling Process. niques for Handling Large Volumes of Data– Programming	Handling g Tips fo	g Large Data: I r Dealing with I	Problems Large Da	s in Har atasets-	ndling L - Case S	arge Studies.							
UNIT- III	Distrib	outed data storage and processing:						9							
Distributing [	Data Sto	rage and Processing with Frameworks: Hadoop – Spark –	Case St	udy: Assessiną	g Risk w	hen Loa	aning M	oney.							
UNIT- IV	NoSQ	L and graph database:						9							
Introduction: Prediction- 0	ACID– ( Graph Da	CAP Theorem – The BASE Principles of NoSQL Database atabase: Introducing Connected Data and Graph Database	es – NoS es – Con	QL Database T nected Data E	Types – xample.	Case S <sup>i</sup>	tudy: Di	sease							
UNIT- V	Text N	lining and Text Analytics:						9							
Text Mining i Case Study:	n the Re Classify	eal World – Text Mining Techniques: Bag of Words – Stem ing Reddit Posts.	iming an	d Lemmatizatio	on – Dec	ision Tr	ee Clas	sifier –							
								Total: 45							
TEXT BOOK	:														
1 Davy C Python	ielen, A Tools",	rno D. B. Meysman, Mohamed Ali, "Introducing Data Scier First Edition, Manning Publications, 2021.	nce – Big	Data, Machin	e Learnii	ng and	more, u	ising							
REFERENC	ES:														
1 Joel Gr	us, "Data	a Science from the Scratch", 2 nd Edition, O'Reilly Publicat	tions, 20	19											
2 http://eo	ducation	.EMC.com/academicalliance, "Data Science and Big data	Analytics	: Discovering,	Analyzir	ıg, Visu	alizing	and							

Presenting Data", 1 st Edition, EMC Education Services, 2015

COURSE OU On completion	TCOME n of the c	<b>S:</b> course, t	the stud	ents will	be able	to						(	BT Mappe Highest Lev	d vel)
CO1 interpre	t the usa	age of d	ata sciei	nce in b	uilding n	nodels a	nd appl	ications				I	Understandi	ng (K2)
CO2 illustrat	e the ma	chine le	earning p	rocess	and tech	nniques	for hand	dling larg	je volum	e of data		I	Understandi	ng (K2)
CO3 apply l	-ladoop a	and Spa	rk platfo	rm for c	lata scie	nce app	lications	6					Applying	(K3)
CO4 design	NoSQL	databas	e for rea	l world	problem	S							Applying	(K3)
CO5 demons	strate the	e text mi	ining tec	hniques	5								Applying	(K3)
Mapping of COs with POs and PSOs														
COs/POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02														
CO1         2         1         2         1         2         2												3		
CO2	2	1	2			2							2	3
CO3	2	1	2	2	3	2							3	3
CO4	2	2	2	2	3	3							3	3
CO5	2	2	2	2	3	3							3	3
1 - Slight, 2 -	Moderat	te, 3 – S	ubstanti	al, BT- E	Bloom's T	Taxonom	ıy							
					ASSES	SMENT	PATTE	ERN - TH	HEORY					
Test / Bloon	n's	Rem	emberi	n   l	Jnderst	andin	Арр	olyin	Ana	lyzin	Evalua	tin	Creatin	Total
Category* g(K1) % g(K2) % g(K3) g(K								K4) %	g(K5	) %	g(K6) %	%		
CAT1			20		80									100
CAT2			20		50		:	30						100
CAT3			20		50			30						100
ESE			20		50	)	:	30						100

\* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

## 22BIE05 - INFORMATION TECHNOLOGY ETHICS Programme& Sem Category Ρ Credit **B.Sc – Information Systems** L т Branch Nil Prerequisites 6 PE 3 0 3 0 This course imparts the different aspects of ethics in information technology. It also deals with the issues Preamble of social networking and intellectual property rights. Unit - I **Overview of Ethics :** g What Is Ethics: Definition of Ethics - The Importance of Integrity - The Difference Between Morals, Ethics, and Laws Ethics in the Business World : Corporate Social Responsibility - Why Fostering Corporate Social Responsibility and Good Business Ethics Is Important - Improving Corporate Ethics - Creating an Ethical Work Environment Including Ethical Considerations in Decision Making : Develop a Problem Statement - Identify Alternatives - Evaluate and Choose an Alternative - Implement the Decision -Evaluate the Results - Ethics in Information Technology-AI Ethics. Unit - II Ethics for IT Workers and IT Users: 9 IT Professionals: Are IT Workers Professionals - Professional Relationships That Must Be Managed - Professional Codes of Ethics - Professional Organizations – Certification - Government Licensing - IT Professional Malpractice - IT Users: Common Ethical Issues for IT Users - Supporting the Ethical Practices of IT Users – Compliance. Unit - III **Computer and Internet Crime:** 9 IT Security Incidents: A Major Concern - Why Computer Incidents are So Prevalent - Types of Exploits - Types of Perpetrators - Federal Laws for Prosecuting Computer Attacks - Implementing Trustworthy Computing: Risk Assessment -Establishing a Security Policy - Educating Employees and Contract Workers - Prevention - Detection – Response. Unit - IV Privacy : 9 Privacy Protection and the Law - Information Privacy - Privacy Laws, Applications, and Court Rulings - Key Privacy and Anonymity Issues : Data Breaches - Electronic Discovery - Consumer Profiling - Workplace Monitoring - Advanced Surveillance Technology- Software Development : Strategies for Engineering Quality Software : The Importance of Software Quality - Software Product Liability - Software Development Process - Capability Maturity Model Integration -Key Issues in Software Development : Development of Safety-Critical Systems - Quality Management Standards. Unit - V Patent and IPR Issues and Social Networking: 9 Patent and IPR Issues : Leahy-Smith America Invents Act - Software Patents - Cross-Licensing Agreements - Trade Secrets :Trade Secret Laws - Employees and Trade Secrets - Key Intellectual Property Issues : Plagiarism - Reverse Engineering - Open Source Code - Competitive Intelligence - Trademark Infringement – Cyber squatting - Social Networking Ethical Issues : Cyber bullying - Cyber stalking - Encounters with Sexual Predators - Uploading of Inappropriate Material- Online Virtual Worlds: Crime in Virtual Worlds - Educational and Business Uses of Virtual Worlds. Total:45 TEXT BOOK: Reynolds W George, "Ethics in Information Technology", 5th Edition, Cengage Learning, 2017. 1 **REFERENCES:** 1. Fabris Adriano, "Ethics of Information and Communication Technologies", 1st Edition, Springer 2018. 2. Luciano Floridi, "The Ethics of Information", Reprint edition, OUP Oxford 2015.

COURSE C	OURSE OUTCOMES: In completion of the course, the students will be able to														
CO1 outline	e the ba	sics of	ethics										Understa (K2	anding )	
CO2 inspe	ct ethics	for IT \	workers	and IT	users								Understa (K2	anding )	
CO3 demo	nstrate o	comput	er and i	nternet	crime								Applying	g(K3)	
CO4 apply	the priv	acy pro	tection	laws ai	nd strat	egies							Applying	g(K3)	
CO5 exam	ine the r	nethod	s for Pa	itent an	d IPR i	ssues							Understanding (K2)		
Mapping of COs with POs and PSOs															
COs/PO         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           s													2 PSO1	PSO2	
CO1	S CO1 2 1									2	3				
CO2	2	1											2	3	
CO3	3	2	1	1									1	3	
CO4	3	2	1	1									2	3	
CO5	2	1											2	3	
1 – Slight, 2	2 – Mode	rate, 3 -	- Substa	intial, B	T- Bloon	n's Taxo	nomy		L						
					AS	SESSM T	ENT PA HEORY	ATTERN ′	-						
Test / Bloom's Category*Rememberin g(K1) %Understandin g(K2) %Applying (K3) %Analyzing (K4) %Evaluating (K5) %											ting ) %	Creating (K6) %	Total %		
CAT1			40		60									100	
CAT2	2		30		50		:	20						100	
CAT3	5		40		40		:	20						100	
ESE			30		50			20						100	

\*  $\pm$ 3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

		22BCE09 SOFTWARE PROJECT MA	NAGEM	ENT				
		(Common to Computer Systems and Design, Information	System	s & Software Sy	vstems)			
Programme& Branch	x	B.Sc – Computer Systems and Design, Information Systems and Software Systems	Sem.	Category	L	т	Р	Credit
Prerequisites	S	Software Engineering	6	PE	3	0	0	3
Preamble	To app project.	ly the managerial aspects of software and focus on plannin.	g, monito	oring and contro	olling va	rious a	ctivities	in a
Unit- I	Introdu	uction:						9
Introduction to Project Portfo Management Programme N	o Softwa Ilio Mana - Manag Ianagen	are Project Management – Project Evaluation and Prograr agement - Evaluation of Individual Projects - Cost benefit E ging the Allocation of Resources - Strategic Programme Ma nent - Some Reservation about Programme Management -	mme Ma Evaluatic nageme Benefits	nagement: Intro on Techniques - nt - Creating a F Management.	oductior Risk E Program	n – A B valuatio nme - A	Susiness on - Pro ids to	s Case – gramme
Unit - II	Project	and Activity Planning:						9
Schedules - F – Adding the Project Durati	Projects a Time Dir ion - Ider	and Activities – Sequencing and Scheduling Activities - Net mensions – The Forward and Backward Pass – Identifying ntifying Critical Activities – Activity on Arrow Networks.	twork Pla g Critical	anning Models – Path – Activity	Formu Float –	lating a Shorte	a Netwo	rk Model
Unit - III	Resour	rce Allocation and Progress Monitoring:						9
Resource Allo Critical Paths Control: Introd Analysis - Prio	ocation: – Coun duction - oritizing	Introduction – Nature of Resources – Identifying Resource ting the Cost – Publishing the Resource Schedule – Cost Creating the Framework - Collecting the Data – Review - V Monitoring - Getting the Project Back to Target - Change C	ce Requi t Schedu /isualizir control.	irements – Sch iles – Schedulir ng Progress - Co	eduling ng Sequ ost Mon	Resou Jence - itoring	Monito - Earne	Creating ring and d Value
Unit - IV	Managi	ing Contracts and People in Software Environment:						9
Managing Co Management Behaviour - S Management-	ontracts: – Accer electing – Health	Introduction - Types of Contract - Stages in Contract F ptance – Managing People in Software Environments: Intr Right Person – Instruction – Motivation – Oldham Hackma y and Safety - Ethical and Professional Concerns.	Placeme oduction n Job Ch	nt - Typical Te - Understandir naracteristics Mo	rms of ng Beha odel – S	a Con aviour - Stress a	tract - - Orgar and its	Contract izational
Unit - V	Workin	ıg in Teams:						9
Introduction – and Virtual Te	· Becomi eams – C	ing a Team - Decision Making – Organization and Team St Communication Genres – Communication Plans – Leadersh	ructures nip.	- Coordination I	Depend	encies	– Dispe	ersed
								fotal:45
TEXT BOOK								
1 Hughes B	Bob, Cott	terell Mike and Mall Rajib, "Software Project Management",	6th Edit	ion, Tata McGra	w- Hill,	New D	elhi, 20	19.
REFERENCE	S:			<u> </u>	<u> </u>	2040		
1 Roger S F	ressma	n, "Soπware Engineering- A practitioners Approach", 9th Ed	aition, M	CGraw-Hill, New	/ York, 2	2019.	tortura	and
Planning	u, Proje with Lea	n, Scrum, Agile.", 6th Edition, Kindle Bosses Ltd, 2020.	s, Produc	cuvity, Profits of	Enterpl	ises, S	arrups	ano

COUR	OURSE OUTCOMES: n completion of the course, the students will be able to														ped
On cor	npletion	of the c	course, t	ne stude	ents will	be able	to							(nighest	_evel)
CO1	evaluat	e projec	ts and t	heir cha	racteris	tics in so	ftware d	levelopr	nent					Applyir	ig (K3)
CO2	apply b	asic ste	ps in pro	oject ma	nageme	ent and c	construc	t networ	k planni	ng mode	els			Applyir	ıg (K3)
CO3	describ	e the iss	sues in r	esource	allocat	ion, proje	ect moni	itoring a	nd contr	ol				Understar	ding (K2)
CO4	acquire	knowle	dge on l	how to n	nanage	contract	s and pe	eople in	software	e enviror	nment			Understar	ding (K2)
CO5	summa	rize diffe	erent rol	es in tea	am worł	K								Understar	ding (K2)
	Mapping of Cos with Pos and PSOs														
COs/F	COs/Pos         P01         P02         P03         P04         P05         P06         P07         P08         P09         P010         P011         P012         PS01         PS02														
CO1 3 2 1 2 2												2	3		
CC	xO2 3 2 1 2 2								2	3					
CC	<b>D</b> 3	2	1									2		2	3
CC	<b>)</b> 4	2	1									2		2	3
CO	<b>D</b> 5	2	1							2	2	2		2	3
1–Sligl	ht,2–Mo	oderate,	3–Subs	tantial,	BT-Bloc	m'sTaxo	onomy					1			
						ASSESS		PATTER	N-THE	ORY					
Test	/ Bloom	ı's	Reme	mbering	g U	nderstar	nding	Appl	ying	Analy	zing	Evaluati	ng	Creating	Total
Category* (K1)% (K2)% (K3)% (K4)% (K5)%								•	(K6)%	%					
CA	T1			20		45		:	35						100
CA	T2			30		50			20						100
CA	Т3			30		70									100
ES	SE			20		45		:	35						100

\*±3%maybe varied (CAT 1,2,3–50marks & ESE–100marks)

		22BCE10 E-COMMERCE						
		(Common to Computer Systems and Design, Information	System	s & Software S	ystems)			
Programme a Branch	&	B.Sc - Computer Systems and Design, Information Systems and Software Systems	Sem.	Category	L	т	Ρ	Credit
Prerequisites	5	Nil	6	PE	3	0	0	3
Preamble	To imp	art the knowledge in various business models and electronic	c comme	erce technologi	es for b	usiness.		
UNIT -I	Busine	ess models for E-commerce:						9
Business moo to Consumer Relationship o	dels for – Busi of Trans	E-commerce: Business Model – E-Business Models Based ness to Business – Consumer to Consumer – Consume action Types: Aggregator model – Brokerage model – Infom	I on the er to Bu ediary n	Relationship o usiness – E-Bu nodel – Advertis	f Transa usiness sing Mo	action P Models del – Aff	arties: Based iliate m	Business d on the lodel.
UNIT -II	eMark	eting:						9
eMarketing: - E- Advertising marketing Stra	Traditior g – E-E ategies	nal Marketing – Identifying Web Presence Goals – The Branding – Marketing Strategies – Permission Marketing – Viral-marketing Strategies – Content Marketing – Social M	e Brow Strateg ledia Ma	sing Behavior ies – Brand-le irketing – Marke	Model veragin eting St	<ul> <li>Onling</li> <li>Strate</li> <li>rategy o</li> </ul>	ne Mar gies – n the W	keting – Affiliate- /eb.
UNIT -III	ePaym	ent Systems:						9
ePayment sys to Buyers – B Digital Signati	stems: D enefits t ures – C	vigital Payment Requirements – Online Payment Categories o Sellers –Transition to digital payment in India – Bitcoin-As Inline Financial Services in India.	<ul> <li>Digita</li> <li>a crypto</li> </ul>	ll Token-based o currency – De	ePaym signing	ent Syst ePayme	ems – I ent Sys	Benefits tems –
UNIT -IV	eSupp	ly Chain and Value Chain Management:						9
eSupply Cha eSCM advan Chain Manag Mahindra Ltd Planning the	in Man tages – ement – – Amul E-Comn	agement: Supply Chain – eLogistics of UPS – Smart eSupply Chain Components – eSupply Chain Architectur Case Study: Supply Chain Management in WalMart World Dairy. Virtual Value Chain – Seven Dimensions of E-Commence Project.	Chains e – Maj – SCM erce Str	Smarter Gains or Trends in e in Dell – Maric ategy – Value (	s- eSC SCM – o Indus Chain ai	M Realt New Tr tries Lim nd E-Str	ime Be rends i lited – I ategy –	enefits – n Supply Mahindra
UNIT- V	eSecu	rity, Legal and Ethical Issues:						9
eSecurity: Inf Environment i Application Fr Privacy.	ormation in India - aud – S	n System Security – Security on the Internet – E-Busines - Legal and Ethical Issues – Ethical Issues in Digital Econon kimming – Copyright Violations – Internet Gambling – Threa	ss Risk ny – Cyl ats to Ch	Management I ber stalking – C ildren – Loss o	ssues yberqua f Privac	<ul> <li>Inform atting – I</li> <li>y – Cool</li> </ul>	ation S Phishin kies and	Security g – d
							То	otal: 45
		nd S. L. "E Commorco An Indian Daranastiva" 6th Editia	יוום מ	oorning Dut 14	d Now	Dolhi 2	010	
	pn P.1 8 <b>: s</b> .	ing S.J., — E-Commerce An Indian Perspective , 6th Editio	II, FHIL	eanning PVI. Lt	u., New	Deini, 2	019.	
1 Sude	- <del></del> . shna Ch	akraborty. Privanka Tvagi. "E-Commerce for Entrepreneurs"	". 1st Ed	lition. BPB Pub	ications	s. 2020.		
2 Kalak	ota Rav	i, Whinston Andrew B, "Frontiers of Electronic Commerce",	1st Editi	on, Pearson Ec	lucation	, 2017.		

COUR On cor	COURSE OUTCOMES: On completion of the course, the students will be able to CO1 interpret the different business models for electronic commerce														apped t Level)
CO1	interpre	et the dif	ferent bu	usiness	models	for elect	ronic co	mmerce						Understar	nding (K2)
CO2	develo	p the bro	wsing b	ehavior	model fo	or a web	site							Applyir	ng (K3)
CO3	illustrat	te the dif	ferent e	-paymer	nt systen	ns								Understar	nding (K2)
CO4	implem	ent supp	oly chair	n manag	ement ir	n various	s busine	sses						Applyir	ng (K3)
CO5	elucida	te how t	o provid	e securi	ty for ele	ectronic	commer	ce world	ł					Understar	nding (K2)
	Mapping of COs with POs and PSOs														
COs/POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02															PSO2
CO1 2 1 1											1	2	3		
С	02	3	2	1	1								1	2	3
С	O3	2	1										1	2	3
С	04	3	2	1	1								1	2	3
С	O5	2	1										1	2	3
1 – Slig	ght, 2 –	Moderat	e, 3 – Sı	ubstantia	al, BT- B	loom's T	axonom	у							
					AS	SESSM	ENT PA	TTERN	- THEO	RY					
Test Ca	/ Bloom tegory*	ı's	Reme a	emberin (K1) %	U	ndersta a (K2	ndin 2) %	Appl a (ł	yin (3)	Analy (K4	zing ) %	Evaluatii q (K5)	n C	creatin q (K6)	Total %
									%	70					
CA	\T1			10		70		2	0						100
CA	T2			10		70		2	0						100
CA	\T3			10		60		3	0						100
ES	SE			20		60		2	0						100

\* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

## 22BIE06 – DEEP LEARNING

Progr	rogramme& B.Sc Information Systems Sem. Category L T P Creation												
Brand	ch												
Prere	quisites		Artificial Intelligence and Machine Learning	6	PE	3	0	0	3				
Prear	nble	To focu framew	is on the fundamental concepts, applications and architectu ork for Deep Learning.	ure of de	ep neural netw	orks and	d open-	source					
Unit–	I	Funda	mentals of Neural networks:						9				
The L – Cor Under Optim Deep	earning N iverting D fitting – E ization Te Learning.	lachines ata into Bias and echnique	<ul> <li>Linear Algebra – Scalars – Vectors – matrices – Tenso</li> <li>Vectors – Types of Machine Learning – Classification F</li> <li>Variance – Overview of Artificial Neural Networks – Biolo</li> <li>Vanishing Gradient Problem – Exploding Gradient Problem</li> </ul>	rs – Hyp Problem ogical Ne olem – N	erplanes – Rel – The Regress urons – Types /eight Initializat	levant M sion Pro s of Artif tion –	athema blem – icial Ne	itical Op Overfit ural Ne	erations ting and tworks –				
Unit –	· II	Convol	utional Neural Network:						9				
Introd Conne Applic	uction – ected Lay ations of	Compor er – Re CNN.	nents of CNN Architecture – Convolution Layer – Poolin ectified Liner Unit Layers – Exponential Linear Unit – U	g of Do Inique P	wnsampling La roperties of C	ayer – F NN – A	-lattenir Architect	ng layer tures of	– Fully CNN –				
Unit -	· III	Recurr	ent Neural Network:						9				
Introd Challe Recur	uction – S enges with rrent Unit -	Simple F N Vanish - Deep	Recurrent Neural Network – Training an RNN – Backprop ning Gradients – Bidirectional and Stateful RNNs – Long S Recurrent Neural Network.	agation Short Te	Through Time rm Memory –	Illustrat LSTM Ir	ion – R npleme	NN Top Intation	ology – – Gated				
Unit –	· IV	Autoen	coder:						9				
Introd – Dee	uction – F p Autoend	eatures coder –	of Autoencoder – Types of Autoencoder – Vanilla Autoenc Denoising Autoencoder – Convolutional Autoencoder – Re	oder – N gularizat	Iultilayer Autoe	encoder - oder.	<ul> <li>Stack</li> </ul>	ed Auto	encoder				
Unit –	- V	Restric	ted Boltzmann Machine and Open source Frameworks	for Dee	p Learning:				9				
Boltzn Learn	nann Mac ing with P	hine – F ython –	Relation to Hopfield Networks – RBM Architecture – Examp Scientific Python – Frameworks – Hardware Support for De	le – Type eep learr	es of RBM – Er hing- Introduction	nvironme on to GA	ental Se AN.	etup – D	eep				
								Total	45				
TEX	кт вооі	<b>K</b> :											
1	Lovely Ro 2020.	ose S, A	shok Kumar L and Karthika Renuka, "Deep Learning Using	Python"	, 1st Edition, W	Viley Ind	ia Pvt. I	_td, Nev	/ Delhi,				
REFE	ERENCE	S:											
1	lan Goodf	ellow, Y	oshua Bengio and Aaron Courville, "Deep Learning", 1st E	dition, M	IT Press, 2016								
2	Josh Patte	erson ar	nd Adam Gibson, "Deep Learning A practitioner"s Approach	n", 1st Ec	lition , O"Reilly	Media I	nc., 201	7.					

COUR	SEOUTO	OMES:												DT Monr	ad
On cor	mpletion	of the co	ourse, th	e studer	nts will b	e able t	0							(Highest Lev	vel)
CO1	explain t	the fund	amental	s of neu	ral netw	orks								Understandi	ng (K2)
CO2	design t	he layer:	s of con	volution	al neura	l networ	k							Applying	(K3)
CO3	apply the	e conce	ots of re	current i	neural n	etwork								Applying	(K3)
CO4	summar	ize the f	eatures	and type	es of au	toencod	ers							Understandi	ng (K2)
CO5	develop	a mode	l using t	he open	source	framewo	orks for o	deep lea	arning					Apply (K	(3)
	Mapping of Cos with Pos and PSOs														
COs	/PO s	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	P01	2 PSO1	PSO2
0	01	2	1											2	3
C	02	3	2	1	1									2	3
C	:03	3	2	1	1									2	3
C	04	2	1											2	3
C	05	3	2	1	1									2	3
1–Sligł	nt,2–Mod	lerate,3-	-Substa	antial,BT	–Bloon	n'sTaxor	nomy								
					Α	SSESS	MENTP	ATTERM	I-THEC	DRY					
1	「est /		Reme	mbering	j(Ur	derstar	nding(	Apply	ing(K	Analyz	ing(K	Evaluatin	ng(K	Creating(K	Total
Bloom	Bloom's Category K1)%					K2)%		3)%		4)	%	5)%		6)%	%
CA	T1			10		60	)	:	30						100
CA	T2			10		50	)		40						100
CA	ТЗ			10		60	)	:	30						100
ES	ESE 10 50 40 100														

\*±3%maybe varied (CAT 1,2,3–50marks & ESE–100marks)

		22BCE12 - AUGMENTED AND VIRTUA	L REALI	ТҮ								
		(Common to Computer Systems and Design, Information	n System	s & Software S	ystems)							
Programme Branch	&	B.Sc - Computer Systems and Design, Information Systems and Software Systems	Sem.	Category	L	т	Р	Credit				
Prerequisite	s	Nil	6	PE	3	0	0	3				
Preamble	To get i various	insight into emerging technologies like Virtual and Augmen tools	ited Real	ity to gain imm	ersive ex	perien	ce using	)				
UNIT - I	Introdu	uction and Augmented Reality						9				
Introduction: - Contact Ler government,	Definitio ns - Heln Comme	ns – Types of Augmented Reality: Types of Augmented Re net - Head-Up Display – Smart - Glasses - Overview of AR rcial and Enterprise, Consumer.	eality Sys system	stems - The Ta organization –	xonomy Key App	of Augr lication	mented s: indus	Reality stry,				
UNIT - II     Virtual Reality     9												
Introduction: virtual worlds transformatic	Virtual F :: Geome ns – Ch	Reality – Modern VR Experiences - Hardware – Software – etric models – Changing position and orientation – Axis – a aining the transformation.	Human Ingle rep	physiology and resentations of	percept rotations	ion – G s – Viev	eometry ving	/ of				
UNIT - III	Workin	ng with SPARK AR						9				
Fundamenta tracker and fa	ls: Layer ace mes	s – Actions – Templates – Creating and prepping assets – h – Face, Hand and 2D body tracking, Background segme	Creating	g 3D objects –	Creating	audio a	assets -	- Face				
UNIT- IV	Workin	ng with Lens Studio						9				
Developing r 3D asset cre	ew 2D v ating – E	vorld – Creating memorable reactions – Setting the stage - External body mesh – Occludes- Body inpainting tool – crea	- Explorii ating and	ng the lens – B I submitting a le	uilding y ens.	our favo	orite AR	lens –				
UNIT- V	Worki	ng with Unity						9				
Working with Callbacks – ( data – Saving	Game of Creating g and Lo	objects – Components – Prefabs – Scenes – Managing Ass frame rate – Accessing components – Finding Objects – C bading game state – Managing object using object pool – S	sets - Bu Coroutine Storing da	ilding Unity Pro s – Singletons ata in assets us	ojects – N – Loadir ing scrip	/lono be ng a sce table ol	ehaviors ene – S ojects	s - toring				
								Total:45				
TEXT BOOK												
1 Jon Pe	ddie, "Au	ugmented Reality", 1 <sup>st</sup> Edition, Springer International Publis	shing, Sv	vitzerland,								
2 Steven	M.Lava	le, "Virtual Reality" Cambridge University Press, 2020										
3 https://s	sparkar.f	acebook.com/ar-studio/learn/tutorials/										
4 https://a	ar.snap.o	com/intermediate-courses										
<sup>5</sup> Paris B	uttfield -	- Addison, Jon Manning and Tim Nugent, "Unity Game Dev	/elopmer	nt Cook Book" -	- 2019 -	Oreilly	publica	tion				
REFERENCI	<u>ES:</u>											
1 Designe Experie	er's Guid <u>nces B</u> y	ie to Snapchat's Lens Studio: A Quick and Easy Resource Phil Walton • 2022	tor Crea	ting Custom At	igmente	a Realit	У					
2 Paul M	ealy, "Vi	rtual & Augmented Reality" – 2018 – John Wiley & Sons										

COUR On co	SE OUT	COMES of the c	<b>S:</b> :ourse, t	he stude	ents will	be able	to							B (Hig	T Mappeo ghest Lev	t el)
CO1	describ	e augme	ented rea	ality, its	types a	nd variou	us applic	ations						Un	derstandir	ng (K2)
CO2	compre	hend vir	tual real	lity mode	els and	transforr	nations							Un	derstandir	ıg (K2)
CO3	demons	strate 2D	,3D obj	ects and	l filters u	using spa	ark AR								Applying (	K3)
CO4	develop	and vis	ualize le	ens stud	io applio	cations u	ising sna	apchat							Applying (	K3)
CO5	perform	various	operati	on on ga	ame obj	ects									Applying (	K3)
	Mapping of COs with POs and PSOs															
COs/	POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO	12	PSO1	PSO2
С	CO1 2 1													2	3	
С	02	2 1 .										2	3			
С	O3	3	2	1	1	2									2	3
С	04	3	2	1	1	2									2	3
С	O5	3	2	1	1	2									2	3
1 – Sli	ght, 2 –	Moderat	e, 3 – S	ubstantia	al, BT- E	Bloom's T	axonom	у								
						ASSES	SMENT	PATTE	ERN - TI	HEORY						
Test / Bloom's Category*Remembering (K1) %Understanding (K2) %Applying (K3)%									Analy (K4	zing )%	Evaluatiı (K5)%	ng	Cr (I	eating K6)%	Total %	
C/	AT1			40		60										100
C	AT2			20		50		;	30							100
C	AT3			20		40			40							100
E	SE			25		40		;	35							100

 ESE
 25
 40
 35

 \* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)