School of Arts and Science

Department of Computational Studies

Minutes of Board of Studies Meeting for B.C.A

The Second meeting of Board of Studies for the course Bachelor of Computer Applications in the Department of Computational Studies was held on 12.04.2021 at 10:00 A.M in the Department of Computational Studies, School of Arts and Science, Sri Manakula Vinayagar Engineering College and also through online with the Head of the Department in the Chair.

The following members were present for the Second Meeting of Board of Studies.

S. No.	Name of the Member with Designation and official Address	Responsibility in the BoS
1	Mr. M. SHANMUGAM,M.Sc.,M.Phil.,M.E.,SET, (Ph.D) Assoc. Prof. and Head, Department of Computational Studies, School of Arts and Science, SMVEC	Chairman
2	Dr. N. VIJAYALAKSHMI, M.C.A., Ph.D. Associate Prof, Department of Computer Science, SRM Institute of Science and Technology(Autonomous) email: vijinatarajan23@gmail.com Mobile: 9941202829,	University Nominee
3	Dr. A. MARTIN, M.C.A., M.Phil., M.E., Ph.D. Asst. Prof, Department of Computer Science, School of Mathematics and Computer Science, Central University of Tamil Nadu, Thiruvarur. email:martin@cutn.ac.in Mobile: 8903756380,	Subject Expert (Academic Council Nominee)
4	Dr. S. BEHIN SAM, M.Sc., M.Tech., Ph.D. Associate Prof, Department of Computer Science, Dr. Ambedkar Arts and Science College, Viyasarpadi, Chennai. email:behinsam@gmail.com Mobile: 9176667525,	Subject Expert (Academic Council Nominee)
5	Mr. C. VIMAL RAJ, B.Tech., Systems Architect, TCS, Chennai. Email: vimal06vishwa@gmail.com Mobile: 9952578333	Industry Expert
6	Dr. P. AURCHANA, M.C.A., M.Tech., Ph.D. Associate Professor, Department of MCA, SMVEC. Email: aurchanamca@smvec.ac.in Mobile: 7603855239	Internal member
7	Mr. R. RAMAKRISHNAN, M.C.A.,M.Phil., M.Tech., (Ph.D) Associate Professor, Dept. of MCA, SMVEC, E-mail:ramakrishnanmca@smvec.ac.in Mobile:9843797091	Internal member
8	Mr. P. KRISHNAMOORTHY, M.Sc., M.Phil., B.Ed. Assistant Professor, Department of Mathematics, School of Arts and Science, SMVEC krishnamat14@gmail.com Cell: 9750028056	Internal member

Agenda of the Meeting

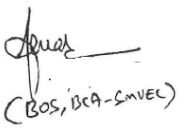
2.1) Confirmation of minutes of 1st meeting of Board of Studies and modifications made.
2.2) To discuss about the Regulations 2020 (R-2020) of Bachelor of Computer Applications.
2.3) Discuss about the Vision and Mission of the Department of Computational Studies.
2.4) To discuss and approve the Academic Calendar for the Odd semester (2021 – 2021).
2.5) Discussion about the Curriculum Structure of Bachelor of Computer Applications.
2.6) To discuss and approve the Syllabi of III and IV semesters for the B.C.A and the students admitted in the Academic Year 2020-21. (First Year).
2.7) To discuss about the uniqueness of the Curriculum (R-2020).
2.8) To discuss and approve Evaluation Systems.
2.9) To discuss about the Innovative Teaching / Practices Methodology adopted to handle the emerging / Advanced Technological concept courses.
2.10) To discuss about the Panel of examiners and to approve for the Academic Council.
2.11) Any other item with the permission of chair.

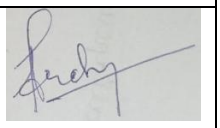
Minutes of the Meeting

Mr. M. Shanmugam, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal members and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

Item:1	Chairman, BoS, appraised the minutes of 1st meeting of BoS, its implementation and then it is confirmed with the approval for the incorporation of minor revisions needed as mentioned below. a) We can combine Data Structure and Algorithms courses as a single course in Semester – II. **The above corrections are approved by BoS members and the details are given in Annexure- I.**
Item:2	Feedback about the Regulations of 2021 (R-2020). Experts have suggested for providing some age relaxation for the Physically challenged people like SC/ST candidates. **The above updation will be considered while revising the regulation in the next time.**
Item:3	The Vision, Mission of Department of Computational Studies are revised, have been presented in the 2nd meeting of BoS. It was approved by BoS members and given in **Annexure- II**.
Item:4	The Academic Calendar for the Odd Semester of Academic year 2020-21(given in **Annexure-III**) were discussed and approved.
Item:5	Curriculum Structure was discussed and recommended to Academic Council. The following modifications are recommended by the BoS Experts. a) In Discipline Specific Elective subjects, it is recommended to include “Client / Server Technology”, “Data Mining”, “Data Science using R”, “Hadoop for Data Science” and “Data Visualization using MATLAB” subjects. **The above corrections have been made in the curriculum and the details are given in Annexure- IV.**
Item:6	Syllabus for Semester-III and Semester – IV were discussed and recommended to Academic Council. The following modifications are recommended by the BoS Experts. a) In Semester-III, in Operating System course, eliminate all the case study from all the units. Because the syllabus is heavy for the UG students. b) In the same course, include some I/O base Linux concepts.

	c) In Operating Systems Lab, eliminate the Multithreading concepts and also reduce the shell programming and increase Operating System concepts. d) In Python Programming Lab, only 10 to 12 exercises are enough. e) In Object Oriented Analysis and Design (DSE), the content of the syllabus must be reduced according to diagram specific. f) In Software Project Management (DSE), reduce the content of all the units. g) In Semester IV, in Database Management Systems course, eliminate Unit – V and move the Transactions Topics to Unit – V. h) In Computer Network Subject, reduce the "Routing Algorithms" concepts. i) Move the "Computer Graphics and Multimedia" course to DSE and bring the "Software Engineering" course as the DSC in Semester-IV. j) In Computer Networks Lab course, try to conduct first 8 exercises using JAVA and remaining programs in CISCO models. **The above corrections have been made in the curriculum and the details are given in Annexure-V**
Item:7	The uniqueness of the curriculum was discussed and accepted by BoS Members. Employability Enhancement Course for Semester-I to Semester-II are listed below: Semester-I => Web Programming Semester-II => Java Programming Semester-III => Python Programming Semester-IV => Mobile Application Development / RDBMS Semester-V => IOT Semester-VI => Data Science / Machine Learning
Item:8	Evaluation system was discussed and accepted by BoS experts.
Item:9	Discussed about Innovative Teaching / Practices Methodology adopted to handle the emerging / advanced technologies and experts have appreciated it.
Item:10	Panel of Examiners also was discussed and recommended to Academic Council.
Item:11	Discussion of the Opportunities for B. C. A.

S. No.	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	Mr. M. SHANMUGAM,M.Sc.,M.Phil.,M.E.,SET, (Ph.D) Assoc. Prof. and Head, Department of Computational Studies, School of Arts and Science, SMVEC	Chairman	
2	Dr. N. VIJAYALAKSHMI, M.C.A., Ph.D. Associate Prof, Department of Computer Science, SRM Institute of Science and Technology(Autonomous) email: vijinatarajan23@gmail.com Mobile: 9941202829,	University Nominee	
3	Dr. A. MARTIN, M.C.A., M.Phil., M.E., Ph.D. Asst. Prof, Department of Computer Science, School of Mathematics and Computer Science, Central University of Tamil Nadu, Thiruvarur. email:martin@cutn.ac.in Mobile: 8903756380,	Subject Expert (Academic Council Nominee)	
4	Dr. S. BEHIN SAM, M.Sc., M.Tech., Ph.D. Associate Prof, Department of Computer Science, Dr. Ambedkar Arts and Science College, Viyasarpadi, Chennai. email:behinsam@gmail.com Mobile: 9176667525,	Subject Expert (Academic Council Nominee)	

5	Mr. C. VIMAL RAJ, B.Tech., Systems Architect, TCS, Chennai. Email:vimalraj_c@gmail.com Mobile: 9952578333	Industry Expert	
6	Dr. P. AURCHANA, M.C.A., M.Tech., Ph.D. Associate Professor, Department of MCA, SMVEC. Email: aurchanamca@smvec.ac.in Mobile: 7603855239	Internal member	
7	Mr. R. RAMAKRISHNAN, M.C.A.,M.Phil., M.Tech., (Ph.D) Associate Professor, Dept. of MCA, SMVEC, E-mail:ramakrishnanmca@smvec.ac.in Mobile:9843797091	Internal member	
8	Mr. P. KRISHNAMOORTHY, M.Sc., M.Phil., B.Ed. Assistant Professor, Department of Mathematics, School of Arts and Science, SMVEC krishnamat14@gmail.com Cell: 9750028056	Internal member	

The meeting was concluded at 12:00 PM with vote of thanks by **Mr. M. Shanmugam**, Head of the Department, Department of Computational Studies.

Mr. M. Shanmugam,
HOD / Dept. of Computational Studies,
Chairman-BoS (B.C.A)

Dean SAS	**Dean Academics**	**Director cum Principal**
[Dr. S. Muthulakshmi]	**[Dr. S. Anbumalar]**	**[Dr. V.S.K. Venkatachalapathy]**

Annexure – I

A20CAT203	DATA STRUCTURES AND ALGORITHMS (Common to B.Sc. CS and B.C.A.)	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To introduce the primary data structures and algorithms for their associated operations.
- To understand the applications of data structures.
- To learn the implementation issues of the data structures introduced.
- To understand the concepts of searching and sorting Techniques.
- To understand the basic concepts of stack, queue, List, Trees and Graphs

Course Outcomes

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

CO1 – Analyze algorithms based on time and space complexity.
CO2 – Implement and Apply linear data structures to solve simple problems.
CO3 – Represent and Apply Non-linear data structures to solve complex problems.
CO4 – Use Divide and conquer method to solve various problems.
CO5 – Use Greedy techniques to solve real time problem.

UNIT I INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS (12 Hrs)

Types of data structures - Abstract Data Type (ADT) - Analysis of algorithm - Time and space complexity - Recurrence relation - Asymptotic notation. Sorting - Searching.

UNIT II LIST AND ADT (12 Hrs)

Static and dynamic Representation – Types -Single Linked List-Doubly Linked List – Circular Linked List – Operations and Applications.

UNIT III STACK ADT (12 Hrs)

Static and Dynamic Representation – Operations - Applications- Balancing Parenthesis- Evaluation of Arithmetic Expression- Infix to Postfix conversion. Queue ADT: Static and dynamic Representation – Linear queue — circular queue.

UNIT IV TREE ADT (12 Hrs)

Representation – Types - Binary Tree- Threaded Binary Tree -Binary Search Tree - Operation and Application. Graph: Representation — Types -Graph Traversal– Depth First Search - Breadth First Search –Application - Minimum cost spanning tree-Topological Sorting.

UNIT V ALGORITHM DESIGN TECHNIQUES (12 Hrs)

Divide and Conquer - General method – Finding Minimum Maximum – Merge Sorting - Greedy Method: General Method – knapsack problem – Single source shortest path – Dijkstras: Job sequencing.

Text Books

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, 4th Edition, Pearson Education, 2013.
2. E. Horowitz, S. Sahni and S. Rajasekaran, “Computer Algorithms/C++”, Second Edition, The OrientBlackswan,2019.
3. A Puntambekar, “Data Structures”, 3rd Revised Edition, Technical Publications Pune, 2008.

Reference Books

1. ReemaThareja, “Data Structures Using C”, Edition, Oxford University Press, 2017.
2. Gilles Brassard, “Fundamentals of Algorithms”, Pearson Education, 2015.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education,Reprint, 2006.
4. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, 2rd Edition,University Press, 2008.

Web References

1. https://www.geeksforgeeks.org/
2. http://opendatastructures.org/
3. https://nptel.ac.in/courses/106/106/106106127

(Annexure – II)

DEPARTMENT OF COMPUTATIONAL STUDIES

VISION AND MISSION

Vision:

To come up with successfully as a high-quality human capital in Computer Science and related areas forthe sustainable growth of the IT industry needs of the country.

Mission:

M1: Innovative Skills:

Ensuring deeper understanding of fundamentals and acquiring innovative skills within core areas of Computer Science.

M2: Motivated Graduates:

Producing highly skilled and motivated graduates with the ability of problem solving individually and in teams.

M3: Ethical Responsibilities:

Providing a deep awareness of our ethical responsibilities to our profession and to the society.

(Annexure – III)

Use of Cell Phones

It has been decided **not to permit cell phones inside the college campus.** If any student is found using the cell phone inside the college campus, it would be confiscated and will not be returned back on any circumstances. Hence the students are instructed not to attend the college with the mobile phones.

Dress Code

The students are requested to attend the college neatly dressed. While the male students should attend the college with the shirts neatly tucked in and with the shoes, the female students are permitted to come with churidar and dupatta properly pined. Students wearing full hand shirts should wear it as such without folding it to half etc. Casual wears like jeans, T-shirts etc., both for boys and girls are strictly prohibited inside the campus. Each department has prescribed uniforms for the labs. The students are requested to strictly adhere to the dress codes as well as the rules and regulations of the college.

Maintenance of Discipline

Discipline is an important factor that shapes one's personality. It is considered as a golden key capable of opening many doors. This institution expects each and every student to follow the rules and regulations in total. Maintaining discipline in the campus will promote a conducive environment for studies.

Working hours

I hr	8.45	to	9.35
II hr	9.35	to	10.25
III hr	10.25	to	11.15
Break	11.15	to	11.30
IV hr	11.30	to	12.20
V hr	12.20	to	1.10
VI hr	1.50	to	2.40
VII hr	2.40	to	3.30
VIII hr	3.30	to	4.20

Lunch break 1.10 p.m. to 1.50 p.m.

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107

SCHOOL OF ARTS AND SCIENCE

Academic Calendar

December 2020 to May 2021

Name :
Department :
Course :
Year / Sem : *I year / I semester*
Class / Sec :

நீங்கள்

அன்பு செய்யுங்கள், யாருக்கும் அடிமையாகாதீர்கள்;
இரக்கம் காட்டுங்கள், எவரிடத்தும் ஏமாந்துவிடாதீர்கள்;
பணிவைப் போற்றுங்கள், எந்த நிலையிலும் கோழையாகாதீர்கள்;
கண்டிப்பாக இருங்கள், எப்போதும் கோபப்படாதீர்கள்;
சிக்கனமாக வாழுங்கள், கருமியாக மாறாதீர்கள்;
வீரமாக இருங்கள், போக்கிரிகளாக மாறாதீர்கள்;
சுறுசுறுப்பாக இருங்கள், பதட்டம் அடையாதீர்கள்;
பொருளைத் தேடுங்கள், பேராசைப் படாதீர்கள்;
உழைப்பை நம்புங்கள், உருப்படுவீர்கள்;
உண்மையை நம்புங்கள், உயர்வடைவீர்கள்!

என்றும் அன்புடன்,
ஆசிரியர்கள்.

About Autonomous

Sri Manakula Vinayagar Engineering College (SMVEC) has been conferred with Autonomous Status by the University Grants Commission on 26th September 2019 and the same was approved by Pondicherry University on 19th June 2020. The School of Arts and Science (SAS) is a new initiative of SMVEC during the academic year -2020 - 21. SAS provides eleven Under Graduate Programmes (B.Com., B.Com. Corporate Secretaryship, B.B.A., B.Sc. Computer Science, B.C.A., B.Sc. Physics, B.Sc. Chemistry, B.Sc. Mathematics, B.A. English, B.Sc. Visual Communication, B.A. Journalism & Mass Communication) follow Regulations 2020-21.

HIGHLIGHTS OF SMVEC AUTONOMOUS REGULATIONS 2020

- Industry 4.0 ready curriculum
- Updated towards skill development to create more job opportunities
- Multidisciplinary curriculum
- More entrepreneurship opportunities
- IELTS model curriculum / Foreign Languages learning opportunities
- Department wise Gold Medals
- Declaration of results within a month after completion of examinations
- **EEC / Mandatory course**

  The Institute has Established 17 Centers of Excellence to provide 75 International Certification courses from IBM, Google, Cisco, E Plan, Microsoft, Autodesk, Texas instruments, Festo, Bentley, Schneider Electric, Amazon web services, Siemens, Tally, DELL EMC², Harita Techserv, PTC, LN an Excellence in Technology & Didactic solutions. All the students should enroll in one of the certification course in every semester
- **Industrial Training / Internship**

  Students may undergo training or internship during summer / winter vacation at Industry/ Research organization. students are also permitted to undergo internships during their eighth semester after the theory classes are over

May 2021

Date	Day	Schedule	Working day/ Holiday
1	Sat		Holiday
2	Sun		Holiday
3	Mon	Submission of student assesment record	
4	Tue		
5	Wed		
6	Thu	ESE - Theory examination starts	
7	Fri		
8	Sat		
9	Sun		Holiday
10	Mon		
11	Tue		
12	Wed		
13	Thu		
14	Fri		
15	Sat		
16	Sun		Holiday
17	Mon		
18	Tue		
19	Wed		
20	Thu		
21	Fri		
22	Sat		
23	Sun		Holiday
24	Mon		
25	Tue		
26	Wed		
27	Thu		
28	Fri		
29	Sat		
30	Sun		Holiday
31	Mon		

Total number of working days :
Total number of holiday :

வெற்றி என்பது, லட்சியத்தைப் படிப்படியாகப் புரிந்து கொள்வது – நைட்டிங்கேல்

April 2021

Date	Day	Schedule	Working day/ Holiday
1	Thu	Submission of CAT-III question papers / Submission of student assesment record	60
2	Fri	Good Friday	Holiday
3	Sat	Syllabus completion	61
4	Sun		Holiday
5	Mon	CAT-III starts	62
6	Tue		63
7	Wed		64
8	Thu		65
9	Fri	BOS-(Dept. of Chemistry, Computational Studies, Comm. & Mgt. - BBA, Dept. of Media studies - Viscom)	66
10	Sat	CAT-III ends/BOS-(Dept of Media Studies, Journalism & Mass Communication	67
11	Sun		Holiday
12	Mon	Departmentwise QCM-3/BOS (Dept. of Physics, English)	68
13	Tue	Submission of CAT-III mark registers	69
14	Wed	Tamil New Year / Dr. Ambedkar Jayanthi	Holiday
15	Thu	Model practical exams	70
16	Fri	Model practical exams	71
17	Sat	Model practical exams	72
18	Sun		Holiday
19	Mon	End semester practical exams	73
20	Tue	End semester practical exams	74
21	Wed	Academic audit	75
22	Thu		76
23	Fri		77
24	Sat		78
25	Sun		Holiday
26	Mon	Model exam starts	79
27	Tue		80
28	Wed		81
29	Thu		82
30	Fri	Model exam ends / Last working day	83

Total number of working days : 03
Total number of holiday : 05

அன்றாட வாழ்வின் சாதாரண விஷயங்களையும், அசாதாரண முறையில் செய்யும்போது உலகின் கவனத்தை உன் மீது திருப்ப முடியும். - ஜார்ஜ்வாஷிங்டன்கார்வர்

❖ **Supplementary Examinations**

Supplementary examination is an additional examination conducted within a month of time after declaring the results. In order to complete the program within 3 years, only the student with maximum of two arrears will be permitted to appear for supplementary examination.

Benefits

- ❖ More number of students will receive the degree within the stipulated time
- ❖ The industries prefers to recruit students having nil arrears. If the supplementary examinations are conducted, then more number of students will be eligible for the recruitment.

❖ **Photo copy of answer book**

After the publication of the result, photocopy of the answer books shall be provided to the student on request with stipulated fee fixed by the College from time to time

Punctuality in Attendance

The students are requested to keep up punctuality in attending the college. The late commers will be losing their attendance and in turn the internal marks. Hence all the students are requested to attend the college in time. A student shall be permitted to appear for the End Semester Examination at the end of the semester only if he / she secures **not less than 75% of overall attendance.**

Repeating the Course

A student who secures overall attendance which is less than 60% has to repeat the course with the approval, when it is next offered.

Tutor Ward System

In the tutor ward system, 30 students are allotted to a tutor who will be taking care of these students. The students are requested to utilize the facility.

The internal marks will be provided fully based on the continuous assessment tests (CAT 1 to 3 and Model examinations)

Marks Distribution of Continuous Assessment Marks (CAM) and End Semester Examination Marks (ESM)

Scheme for Continuous Assessment Test

S. No	Course Type	Continuous Assessment components									
		Test Marks	Average of marks for proposal test/ viva for each experiment	Average of marks for experiment report for each experiment	Model Exam / Report	Assignment	Review - 1	Review - 2	Review - 3	Attendance	Total Marks
1.	Theory	15	-	-	-	5	-	-	-	5	25
2.	Practical	-	10	15	15	-	-	-	-	10	50
3.	Project work	-	-	-	-	-	10	10	20	-	40

Question Paper Pattern

Question paper pattern for CAT and ESE will be based on the patterns shown in Table (a) and (b)

Table (a) Question Paper pattern for CAT / Model exam

Test Type	2 Marks	5 Marks	10 Marks	Total Marks
CAT 1 to 3	5	4	2 (open choice)	50
Model exam	End semester Examination Question Pattern			75

Table (b) Question paper patterns for End semester Examination (ESE)

2 Marks	5 Marks	10 Marks	Total Marks
10	5 (one question from each unit)	3 (out of 5) (open choice)	75

March 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon	Submission of student assesment record	33
2	Tue		34
3	Wed		35
4	Thu		36
5	Fri		37
6	Sat		38
7	Sun		Holiday
8	Mon		39
9	Tue		40
10	Wed	Submission of CAT-II question papers	41
11	Thu		42
12	Fri	Departmentwise QCM - 2	43
13	Sat		44
14	Sun		Holiday
15	Mon	CAT - II starts	45
16	Tue		46
17	Wed		47
18	Thu		48
19	Fri		49
20	Sat	CAT - II ends	50
21	Sun		Holiday
22	Mon		51
23	Tue		52
24	Wed	Submission of CAT-II Mark registers / 17th IQAC meeting	53
25	Thu		54
26	Fri		55
27	Sat		56
28	Sun		Holiday
29	Mon		57
30	Tue	BOS (Dept of Commerce & Management-BCom)	58
31	Wed	BOS (Dept of Mathematics, Commerce & Management-BCom(CS)	59

Total number of working days : 27
Total number of holiday : 04

உலகை வெல்வதற்கு, உலகை தெரிந்து கொள்வது முக்கியமல்ல,
உன்னை அறிந்து கொள்வதுதான் முக்கியம் . . .

February 2021

Date	Day	Schedule	Working day/ Holiday
1	Mon	Commencement of regular offline classes	10
2	Tue		11
3	Wed		12
4	Thu		13
5	Fri		14
6	Sat		Holiday
7	Sun		Holiday
8	Mon		15
9	Tue		16
10	Wed	Submission of CAT-I question papers	17
11	Thu		18
12	Fri	Departmentwise QCM - 1	19
13	Sat	Motivational programme	20
14	Sun		Holiday
15	Mon	CAT - I starts	21
16	Tue		22
17	Wed		23
18	Thu		24
19	Fri		25
20	Sat	CAT - I ends / Guest lecture - Dept of Com. & Mgt., Dept. of Computational Studies	26
21	Sun		Holiday
22	Mon	Ulaga Thaimozhi Thinam- Dept of Tamil	27
23	Tue		28
24	Wed	Submission of CAT-1 Mark registers / ICARMS 2021 - Dept. of Mathematics	29
25	Thu	Remedial classes start	30
26	Fri		31
27	Sat	Budget meet by Dept of Com. & Mgt.	32
28	Sun		Holiday

Total number of working days : 23
Total number of holidays : 05

தளராத இதயம் உள்ளவருக்கு, இவ்வுலகில் முடியாதது என்று எதுவுமே இல்லை
– புக்கன்ஸ்

Distribution of Attendance marks for theory : 5 marks

The distribution of 5 marks for theory class attendance is as follows :
5 marks for 95% attendance and above
4 marks for 90% attendance and above but below 95%
3 marks for 85% attendance and above but below 90%
2 marks for 80% attendance and above but below 85%
1 mark for 75% attendance and above but below 80%

Distribution of Attendance marks for practical : 10 marks

The distribution of 10 marks for practical class attendance is as follows :
10 marks for 95% attendance and above
8 marks for 90% attendance and above but below 95%
6 marks for 85% attendance and above but below 90%
4 marks for 80% attendance and above but below 85%
2 marks for 75% attendance and above but below 80%

Note :

Students should not be absent for the classes. Attendance for the classes are monitored regularly and recorded. Continuous assessment mark will be based on the performance of the students in the continuous assessment test, Assignments and attendance percentage.

Assignments

Out of 25 (continuous assessment marks), 5 Marks will be awarded for the assignment. The students have to submit 3 assignments in each subject. The assignment questions will be different for each and every student.

Importance of Continuous Assessment marks

The continuous assessment marks once earned are carried over to the subsequent exams also. Hence the students are requested to work hard to get the maximum of the continous assessment marks. If the continous assessment marks are lower, it will pull down chances of getting the first class, distinction, gold medals and ranks.

Importance of CAT-I/CAT-II/CAT-III/Model exam

Continous assessment marks are awarded for the performance in the CAT-I, CAT-II, CAT-II, CAT-III & Model exam. Hence all the students are requested to prepare well for each test / examination to earn the maximum continuous assessment marks.

Undertaking Minor / Major Projects

Each student is advised to take atleast one minor project. Involving in the project will be helping to understand the basics of the subject. Some of the minor / major project will also be benefiting the society. Moreover, the Management awards cash prizes for the best projects in each department.

Participation in the Curricular / Co-curricular / Extra curricular Activities

All the students are encouraged to participate in the curricular / co-curricular / extra curricular activities. Involvement in these activities will improve their knowledge level in the subject. If a student or a team gets cash prize / award at the technical event organised by the recognised institutions, then the management of this institution will also sanction an amount equivalent to the award / cash prize as a token of appreciation.

Leave Account Record

For each student, leave account record has been provided. The students are instructed to show the leave record to their parents and strictly adhere to the instructions given for availing the leave. The leave account record should be maintained properly and prior approval must be obtained for availing the leave. In exceptional cases, the students are permitted to get the approval after availing the leave.

Transport Facility

56 buses have been arranged for the students to reach the college from Puducherry, Kanagachettikulam, Villupuram, Neyveli, Panruti, Cuddalore, Nellikuppam, Madukarai and Tindivanam covering almost all the areas. Separate transport facility has been arranged for the students who remain in the college after 5 p.m. for utilising computer lab, library and sports facilities. The students are requested to utilise the transport facility.

All the students are requested to avoid mobile phones and avoid travel by two wheelers considering their safety and security.

January 2021

Date	Day	Schedule	Working day/ Holiday
1	Fri		Holiday
2	Sat		Holiday
3	Sun		Holiday
4	Mon	Online / Offline class starts	20
5	Tue		21
6	Wed		22
7	Thu		23
8	Fri		24
9	Sat		25
10	Sun		Holiday
11	Mon		26
12	Tue		27
13	Wed		Holiday
14	Thu		Holiday
15	Fri		Holiday
16	Sat		Holiday
17	Sun		Holiday
18	Mon		28
19	Tue	Online class ends	29
20	Wed	SAS Inauguration / Induction day	1
21	Thu		2
22	Fri		3
23	Sat	Mupperum Vizha - Departments of Tamil, English & Media Studies	4
24	Sun		Holiday
25	Mon		5
26	Tue	Republic day	Holiday
27	Wed		6
28	Thu		7
29	Fri		8
30	Sat		9
31	Sun		Holiday

Total number of working days : 19
Total number of holidays : 12

நீ வெற்றியடைவதை உன்னைத் தவிர, வேறு யாராலும் தடுக்க முடியாது – ப்ளாம்

December 2020

Date	Day	Schedule	Working day/ Holiday
1	Tue		
2	Wed		
3	Thu		
4	Fri		
5	Sat		
6	Sun		Holiday
7	Mon	Online class starts	1
8	Tue		2
9	Wed		3
10	Thu		4
11	Fri		5
12	Sat		Holiday
13	Sun		Holiday
14	Mon		6
15	Tue		7
16	Wed		8
17	Thu		9
18	Fri		10
19	Sat		Holiday
20	Sun		Holiday
21	Mon		11
22	Tue		12
23	Wed	17th IQAC meeting	13
24	Thu		14
25	Fri		15
26	Sat		Holiday
27	Sun		Holiday
28	Mon		16
29	Tue		17
30	Wed		18
31	Thu		19

Total number of working days : 19
Total number of holiday : 06

நீ வெற்றியடைவதை உன்னைத் தவிர, வேறு யாராலும் தடுக்க முடியாது – ப்ளாஸ்

Placement and Training Division

The placement cell functions round the clock throughout the year to establish contact with reputed multinational companies, well established industrial organizations and plays an important role in locating various job opportunities and placing large number of the students every year at these organizations.

Activities of the Training Division

- Arranges trainings for personality and interpersonal skill development.
- Assists the students to get in-plant training
- Arranges industrial visits
- Creates awareness on the opportunities open for higher studies.
- Arranges coaching classes for GATE, GRE, TOFEL, IELTS, IAS, IES etc.

Placement Record

Academic Year	Students Placed
2012-13	75%
2013-14	85%
2014-15	95%
2015-16	95%
2016-17	93%
2017-18	95%
2018-19	95%
2019-20	95%

Details of Placed Students : 2020 - 21

1 Kaar	9	12 Makolet	3
2 TCS (Ninja and Digital)	210	13 O2Saver	4
3 Hexaware	15	14 OPPO Mobiles	3
4 Yellow Messanger	4	15 Infosys	1
5 Unisys	1	16 Sutherland	56
6 EmbedUr	1		
7 Virtusa	3		
8 ZOHO	8		
9 CTS	101		
10 Milekel Engineering	1		
11 Mantec Electronic	1	Total	*421

** till 31st January 2021*

Wi-Fi Campus

Our campus has been enabled by high speed uninterrupted Wi-Fi connectivity. The Computer Centre is open till 8.00 p.m. on all the working days except on the dates of University examinations.

Library Working Hours

8.30 a.m. to 8.30 p.m. (On all the working days)
8.30 a.m. to 10.00 p.m. (During the examination days)

Women Cell

For the benefit of the girl students, a Women Cell has been constituted in the college. The girl students may approach the Chairperson / members for assistance.

Grievance Redressal Cell

There is a Grievance Redressal Cell under the Chairmanship of the Director of the institution. Students are requested to approach the Chairman / members to redress their grievances. Mail ID : grievance@smvec.ac.in

Gold Medals and Top Ten Ranks

Your seniors were sincere, hard working and got the Gold medals of the Pondicherry University and the top ten ranks in all the branches. The details of the University Goldmedals and Top Ten Ranks won by the students are given below.

Indicates the Gold medal and University First Rank.

The Management awards 3 sovereigns of gold to the 1st rank holder, 2 sovereigns to the 2nd rank holder, 1 sovereign to the 3rd rank holder, 4th and 5th rank holders shall receive a cash award of Rs. 10,000/- (Rupees ten thousand) each and 6th to 10th rank holders shall receive a cash award of Rs. 5,000/- (Rupees five thousand) each.

Name of the Course	Year		
	2017	2018	2019
BTech EEE	2, 4, 6, 7		2,3,4,6,7,8,9,10
BTech ECE	2,3,4,5,6,7,8,9,10		,3,4,5,6,7,9,10
BTech CSE	,2, 3, 4, 10		,2,4,6,7,8,10
BTech IT	,2,3,4,5,6,7,8,9,10		2,3,5,6,8
BTech ICE	,2,3,4,5,6,7,8,9,10		2,3,4,5,6,7,8,9,10
BTech Mech	,4, 5, 7, 9, 10		3,7,8,10
BTech Civil	2, 3, 10		2,3,4,6,7,10
MCA	3,4,7,9,10		2,6,7,8,9,10,11
MBA	3,4,6,7,8		2,3,4,5,7,8,10
MTech CSE	2, 3, 4, 5, 7, 8, 9		,7
MTech ECE	2, 3, 6, 7, 8, 9		2,3,4,5
MTech PED			,2,3
MTech NW	2, 3, 4, 5, 7, 8, 9		,2,3
MTech(VLSI)			,2,3,4
MTech(MF)	,2		

Important points for the kind attention of the Parents

Dear Parent

The I semester classes commence on 7th December 2020. The students have to complete a lot of work within a short period. Hence the parents are kindly requested not to permit their wards to avail frequent leave during this semester period for the following reasons.

It is compulsory for all the students to complete Six Certificate Courses, Nine Skill Development Courses and Eight Mandatory Courses along with their Academic Courses. These courses will enhance the students to upgrade their required skills to cope up with the Industry.

Marks in the **continuous assessment test** decide the major part of the continous assessment marks. So, availing leave for the continuous assessment test must be avoided at any cost as this would seriously affect the assessment marks.

Practicals are very important not only to score more marks but also it will help to understand the theory part of the subject, hence advice your ward not to cut the practical classes.

Please spare your **valuable time to talk to your son/daughter every day and try to understand what he/she is doing in respect of his/her studies.** Kindly extend all your support to your son/daughter which will help them to come out successfully. For any assistance from our side you may always feel free to contact the respective HOD / DEAN any time during the working hours.

(Annexure – IV)

DISCIPLINE SPECIFIC ELECTIVE COURSES

DISCIPLINE SPECIFIC ELECTIVES										
S. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Discipline Specific Electives (DSE - I) - offered in Third Semester										
1	A20CPE301	Software Management	DSE	3	0	0	3	25	75	100
2	A20CPE302	Object Oriented Analysis and Design	DSE	3	0	0	3	25	75	100
3	A20CPE303	Client / Server Technology	DSE	3	0	0	3	25	75	100
4	A20CPE304	Data Mining	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - II) - offered in Fourth Semester										
1	A20CPE404	Hadoop for Data Science	DSE	3	0	0	3	25	75	100
2	A20CPE405	Data Science using R	DSE	3	0	0	3	25	75	100
3	A20CPE406	Data Visualization using MATLAB	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - III) - offered in Fifth Semester										
1	A20CPE507	Information Security	DSE	3	0	0	3	25	75	100
2	A20CPE508	Network Security	DSE	3	0	0	3	25	75	100
3	A20CPE509	Ethical Hacking	DSE	3	0	0	3	25	75	100
Discipline Specific Electives (DSE - IV) - offered in Sixth Semester										
1	A20CPE610	IT Assessment and Risk Analysis	DSE	3	0	0	3	25	75	100
2	A20CPE611	Intrusion Detection System and Prevention	DSE	3	0	0	3	25	75	100
3	A20CPE612	Introduction to Data Science and Machine Learning	DSE	3	0	0	3	25	75	100

(Annexure – V)

(In Semester-III, in Operating System course, eliminate all the case study from all the units.

In the same course, include some I/O base Linux concepts.)

		L	T	P	C	Hrs
A20CAT305	**OPERATING SYSTEMS**	**4**	**0**	**0**	**4**	**60**

Course Objectives

- To grasp a fundamental understanding of operating systems and processes
- To learn the concepts of CPU scheduling and deadlock
- To understand synchronization and memory management concepts in OS
- Understand the concepts of file systems and secondary storage structure
- To learn the features of commercial operating systems

Course Outcomes

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

CO1 - Define the concepts of operating systems operations, processes and threads.
CO2 - Apply the concepts of CPU scheduling and deadlock techniques.
CO3 - Simulate the principles of memory management.
CO4 - Identify appropriate file system and disk organizations for a variety of computing scenario.
CO5 - Examine the features of various open source operating systems.

UNIT I INTRODUCTION AND PROCESS MANAGEMENT (12Hrs)

Operating system structure – Operating system operations – Process management – Memory management – Storage management – Protection and Security – System structures: Operating system services – System calls – Types of system calls – System programs. Process scheduling – Operations on processes – Inter-process communication.

UNIT II CPU SCHEDULING AND DEADLOCK (12Hrs)

Overview of threads – Multithreading models – Threading issues – Basic concepts of process scheduling – Scheduling criteria – Scheduling algorithms – Multiple processor scheduling, Dead Lock: Characterization – Prevention Detection – Avoidance and Recovery.

UNIT III CONCURRENT PROCESSES AND MEMORY MANAGEMENT (12Hrs)

Process synchronization: The Critical Section Problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors. Memory Management: Swapping – Contiguous memory allocation – Paging – Structure of the Page Table – Segmentation, Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

UNIT IV FILE SYSTEMS AND SECONDARY STORAGE STRUCTURE (12Hrs)

File Concept - Access Methods - Directory structure - File system mounting - File sharing - Protection - File system structure - File system implementation - Directory Implementation - Allocation methods - Free-space management. Disk structure - Disk Scheduling - Disk Management - Swap-Space management.

UNIT V I/O BASED LINUX (12Hrs)

LINUX System: Basic Concepts – System administration – Requirements for Linux System Administrator – Setting up a LINUX multifunction server – Domain Name System – Setting up local network services.

Text Books

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, John Wiley & Sons Ninth Edition, 2017.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India, 3rd Edition, 2015.
3. Gary Nutt, “Operating Systems - A Modern Perspective”, Pearson Education, Second Edition, 2013.

Reference Books

1. William Stallings, “Operating System”, Prentice Hall of India, 6th Edition, 2015.
2. Thomas Anderson and Michael Dahlin, “Operating Systems principles and practice”, Wiley, 2nd Edition, 2014.
3. Harvey M. Deitel, “Operating Systems”, Pearson Education, Third Edition, 2013.
4. Silberschatz, Galvin, “Operating System Concepts”, Wiley, Student Edition, 2006.
5. William Stallings, “Operating System: Internals and design Principles”, New Edition (7), Pearson Education India.

Web References

1. https://nptel.ac.in/courses/106108101/
2. http://www.tcyonline.com/tests/operating-system-concepts
3. http://www.galvin.info/history-of-operating-system-concepts-textbook
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/index.html
5. https://www.cse.iitk.ac.in/pages/CS330.html

(In Operating Systems Lab, eliminate the Multithreading concepts and also reduce the shell programming and increase Operating System concepts)

A20CAL305	OPERATING SYSTEMS LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To learn basic UNIX / LINUX commands
- To develop programs in Linux environment using system calls.
- To implement the CPU scheduling algorithms.
- To implement Deadlock handling algorithm.
- To develop solutions for synchronization problems using semaphores

Course Outcomes

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

CO1 – Understand the basic commands for UNIX / Linux.
CO2 – Develop simple shell programs**.**
CO3 – Implement different Scheduling Algorithms.
CO4 – Apply the basic concepts of Deadlock Handling procedures.
CO5 – Simulate Critical Section problem using Semaphore.

List of Exercises

1. Study of basic UNIX / Linux commands
2. Shell Programming - I
    (a) To Write a Shell program to count the number of words in a file.
    (b) To Write a Shell program to calculate the factorial of a given number.
    (c) To write a Shell program to generate Fibonacci series.
    (d) Write a Shell Program to wish the user based on the login time.
3. Shell Programming - II
    (a) Loops
    (b) Patterns
    (c) Expansions
    (d) Substitutions
4. Programs using the following system calls of UNIX/Linux operating system: fork, exec, getpid, exit, wait, close, stat, open dir, read dir.
5. To write a program to simulate cat command.
6. To write a program to simulate head and tail commands.
7. Simulate UNIX commands like ls, grep.
8. Process Scheduling- FCFS, SJF, Priority and Round robin.
9. Implementation of Banker's algorithm.
10. Producer and Consumer problem using semaphores.

Reference Books

1. William Stallings, "Operating System", Pearson Education, Sixth edition, 2015.
2. Andrew S. Tanenbaum, Modern Operating Systems,3rd edition Prentice Hall of India Pvt. Ltd, 2015.
3. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt, Third Edition, 2013
4. William Stallings, "Operating System: Internals and design Principles", Old Edition(7), Pearson Education,2013.
5. Silberschatz, Galvin, "Operating System Concepts", Wiley, Student Edition,2006.

Web References

1. https://www.geeksforgeeks.org
2. http://avanthioslab.blogspot.com/2016/08/file-organization-techniques.html
3. https://www.programming9.com/programs/c-programs/285-page-replacement-programs-in-c

(In Python Programming Lab, only 10 to 12 exercises are enough.)

A20CAL306	PYTHON PROGRAMMING LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To acquire programming skill in core python.
- To learn how to design python program and applications.
- To acquire object oriented skills in python.
- To design and implement modules and packages.
- To develop the skill of designing applications.

Course Outcomes

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

CO1 - Examine Python syntax and semantics.
CO2 - Demonstrate proficiency in handling Strings and File Systems.
CO3 - Compile, run and manipulate Python Programs using core data structures.
CO4 - Interpret the concepts of Object-Oriented Programming as used in Python.
CO5 - Implement exemplary applications related to modules and packages in Python.

List of Exercises

1. Demonstrate python program using Arithmetic expressions and Relational Expressions.
2. Demonstrate python program using Strings.
3. Demonstrate python program for the decision making statements.
4. Write Python Functions to facilitate code reuse.
5. Basic python applications using List, Tuples, Sets.
6. Implementation of Searching and Soring.
7. Implement python programs using Dictionaries
8. Illustrate file concepts with real time problems
9. Use Exception handling in python applications for error handling.
10. Implement simple applications using Modules and Packages.

Reference Books

1. Reema Thareja, “Python Programming Using Problem Solving Approach”, Oxford University Press; First edition,2017.
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter- disciplinary Approach”, Pearson India Education Services Pvt.,2016.
3. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,2015.
4. Ben Stephenson, “The Python Workbook A Brief Introduction with Exercises and Solutions”, Springer International Publishing, 2014.
5. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Pragmatic Programmers, LLC, Second edition, 2013.

Web References

1. https://nptel.ac.in/courses/106/106/106106182/
2. https://www.learnpython.org/
3. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
4. https://www.codecademy.com/learn/learn-python

(In Object Oriented Analysis and Design (DSE), the content of the syllabus must be reduced according to diagram specific.)

A20CAE302 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C	Hrs
3	0	0	3	45

Course Objectives

- To understand objects, classes and inheritance.
- To learn the utilization of software objects to build software projects.
- To use UML in requirements elicitation and designing.
- To gain knowledge in the concepts of relationships and aggregations.
- To extract Object Oriented Analysis Processes.

Course Outcomes

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

CO1 - Analyze, design and document the requirements through use case driven approach.
CO2 - Categorize the different object oriented methodologies.
CO3 - Develop and Explore the Classes and Its Relationships.
CO4 - Apply the concepts of architectural design for view layer and access layer.
CO5 - Test for the software quality using different testing strategies.

UNIT I AN OVERVIEW OF OBJECT ORIENTED SYSTEM DEVELOPMENT (9 Hrs)

Introduction – Object Oriented System Development Methodology – Why object orientation – Overview of Unified Approach – Object Basics: Object oriented philosophy – Objects – Classes – Attributes – Object behavior and methods – Encapsulation and Information Hiding – Class hierarchy – Polymorphism – Object Relationships and Associations.

UNIT II OBJECT ORIENTED METHODOLOGIES (9 Hrs)

Rumbaugh et al.'s Object modeling technique – Booch methodology – Jacobson et al. Methodologies – Patterns – Framework – Unified approach – Unified modeling language: Static and Dynamic Model – UML Diagrams – UML class diagram – UML use case diagram - UML dynamic modeling – UML extensibility – UML meta model.

UNIT III OBJECT ORIENTED ANALYSIS (9 Hrs)

Business object analysis – Use case driven object oriented analysis – Business process modeling – Use Case model - Developing Effective Documentation – Naming Classes – Identifying Object Relationships – Attributes and Methods: Association – Super-Subclass Relationship – IS-A Relationship.

UNIT IV OBJECT ORIENTED DESIGN (9 Hrs)

Object Oriented Design Process – Object Oriented Design Axioms – Corollaries – Designing Classes: Object constraint language – Process of designing class – Class visibility – Refining attributes –View Layer: Designing View Layer Classes – Macro Level Process – Micro Level Process – Purpose of View Layer Interface – Prototyping the user interface.

UNIT V SOFTWARE QUALITY (9 Hrs)

Software Quality Assurance: Quality Assurance Test – Testing strategies – Impact of object oriented testing – Test cases – Test Plan – Myers debugging principle. System usability and measuring user satisfaction: Usability testing – User satisfaction testing.

Text Books

1. John Deacon, “Object Oriented Analysis and Design”, Addison Wesley, 1st Edition, 2012.
2. Grady Booch, James Rumbaugh, and Ivar Jacobson, “The Unified Modeling Language User Guide”, Addison Wesley, 3rd Edition , 2011.
3. Ali Bahrami, “Object oriented systems development using the unified modeling language”, McGraw- Hill, 1st Edition, 2008.

Reference Books

1. Craig Larman, “Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Developmentll”, Pearson Education, Third Edition, 2005.
2. Mike O’Docherty, “Object-Oriented Analysis & Design: Understanding System Development with UML 2.0”, John Wiley & Sons, 2005.
3. Bernd Oestereich, “Developing Software with UML, Object - Oriented Analysis and Design in Practice”, Addison-Wesley, 2nd Edition 2004.
4. Martin Fowler, “UML Distilled: A Brief Guide to the Standard Object Modeling Language”, Third edition, Addison Wesley, 2003.
5. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, “Design patterns: Elements of Reusable Object-Oriented Software”, Addison-Wesley, 1995.

Web References

1. www.omg.org
2. http://www.ibm.com/developerworks/rational/products/rose/
3. http://www.smartdraw.com/resources/tutorials/jacobson-oose-diagrams/
4. https://www.tutorialspoint.com/object_oriented_analysis_design/index.htm
5. https://www.uml-diagrams.org/
6. https://nptel.ac.in/courses/106/105/106105153/

(In Software Project Management (DSE), reduce the content of all the units.)

		L	T	P	C	Hrs
A20CAE303	**SOFTWARE PROJECT MANAGEMENT**	**3**	**0**	**0**	**3**	**45**

Course Objectives

- To understand objects, classes and inheritance.
- To learn the utilization of software objects to build software projects.
- To use UML in requirements elicitation and designing.
- To gain knowledge in the concepts of relationships and aggregations.
- To extract Object Oriented Analysis Processes.

Course Outcomes

After completion of the course, the students will be able to
CO1 - Analyze, design and document the requirements through use case driven approach.
CO2 - Categorize the different object oriented methodologies.
CO3 - Develop and Explore the Classes and Its Relationships.
CO4 - Apply the concepts of architectural design for view layer and access layer.
CO5 - Test for the software quality using different testing strategies.

UNIT I: PROJECT CONCEPTS AND ITS MANAGEMENT (9 Hrs)
Project life cycle models - ISO 9001 model - Capability Maturity Model - Project, Planning Project tracking - Project closure - Evolution of Software Economics – Software Management Process Framework: Phases, Artifacts, Workflows, Checkpoints.

UNIT II: COST ESTIMATION (9 Hrs)
Problems in Software Estimation – Algorithmic Cost Estimation Process, Function, Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model) – Estimating Web Application Development – Concepts of Finance, Activity Based Costing and Economic Value Added (EVA) – Balanced Score Card.

UNIT III: SOFTWARE QUALITY MANAGEMENT (9 Hrs)
Software Quality Factors – Software Quality Components – Software Quality Plan– Software Quality Metrics – Software Quality Costs – Software Quality Assurance-Standard – Certification – Assessment.

UNIT IV: SOFTWARE MANAGEMENT AND METRICS (9 Hrs)
Software Configuration Management – Risk Management: Risk Assessment: Identification / Analysis / Prioritization – Risk Control: Planning / Resolution /Monitoring – Failure Mode and Effects Analysis (FMEA) –Defect Management-Cost Management. Software Metrics –

UNIT V: PROJECT EVALUATION AND EMERGING TRENDS (9 Hrs)
Strategic Assessment–Technical Assessment–Cost Benefit Analysis–Cash Flow Forecasting– Cost Benefit Evaluation Technique–Risk Evaluation–Software Effort Estimation. Emerging Trends: Import of the internet on project Management –people Focused Process Models.

Text Book:

1. Ramesh Gopalaswamy, “Managing and Global Software Projects”, Tata McGraw Hill, 2017.
2. Neal Whitten, “Managing Software Development Projects”, John Wiley & Sons, Inc., 2 nd Ed., 1995.

Reference Books:

1. Demarco, T. and Lister, T. “Peopleware: Productive Projects and Teams, 2nd Ed.”, Dorset House, 1999.
2. Royce, W. “Software Project Management: A Unified Framework”, Addison-Wesley, 1998.
3. Demarco, T. and Lister, T. “Peopleware: Productive Projects and Teams, 2ndEd.”, Dorset House,1999.
4. Fenton, N.E., and Pfleeger, S.L. “Software Metrics: A Rigorous and Practical Approach, Revised” Brooks Cole, 1998.

Web References

1. www.omg.org
2. http://www.ibm.com/developerworks/rational/products/rose/
3. http://www.smartdraw.com/resources/tutorials/jacobson-oose-diagrams/
4. https://www.tutorialspoint.com/object_oriented_analysis_design/index.htm
5. https://www.uml-diagrams.org/
6. https://nptel.ac.in/courses/106/105/106105153/

(In Semester IV, in Database Management Systems course, eliminate Unit – V and move the Transactions Topics to Unit – V.)

		L	T	P	C	Hrs
A20CAT407	**DATABASE MANAGEMENT SYSTEMS**	**4**	**0**	**0**	**4**	**60**

Course Objectives

- To learn about Database Structure and Data Models.
- To study SQL Commands for storing and retrieving data into the database.
- To study the Relational database system design
- To understand the concept of Transactions
- To understand the concept of Concurrency Control and Recovery System

Course Outcomes

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

CO1 - Design conceptual data model using Entity Relationship Diagram.
CO2 - Design conceptual and logical database models for an application.
CO3 - Normalize relational database design of an application.
CO4 - Explain the need for Indexing, Hashing and Transactions in database**.**
CO5 - Understand the strategies for providing security, privacy, and recovery of data.

UNIT I INTRODUCTION (12Hrs)

Database System Application – Purpose of Database Systems – View of Data – Database Languages – Relational Database – Database Design – System Structure – Database Architecture. Database Design and E-R Model: Overview of the Design Process – The E-R Model – Constraints – E-R Diagrams- E-R Design Issues – Extended E-R features – Reduction to Relational Schemas – Other aspects of Database Design.

UNIT II RELATIONAL MODEL (12Hrs)

Structure of Relational Database – Fundamental Relational Algebra Operations – Extended Relational Algebra Operations – Modification of the Database. Structured Query Language: Introduction – Basic Structure of SQL Queries – Set Operations – Additional Basic Operations – Aggregate Functions – Null Values – Nested Sub queries – Views – Join Expression.

UNIT III RELATIONAL DATABASE DESIGN (12Hrs)

Features of Good Relational Designs – 1NF – 2NF – 3NF and 4NF with Examples. Atomic Domains and first Normal form – Decomposition using Functional Dependencies – Functional Dependency Theory – Algorithm for Decomposition – Decomposition using Multivalued Dependencies.

UNIT IV INDEXING - HASHING AND TRANSACTION MANAGEMENT (12Hrs)

Basic Concepts – Ordered Indices – B+ Tree Index Files – B-Tree Files – Multiples – Key Access – Static Hashing – Dynamic Hashing – Comparison of Ordered Indexing and Hashing – Bitmap Indices.

UNIT V TRANSACTION MANAGEMENT (12Hrs)

Transaction Management: Transaction concept – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation and Atomicity – Serializability – Recoverability – Transaction Isolation Levels – Implementation of Isolation Levels.

Text Books

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, “Database System Concepts”, McGraw-Hill, 7th Edition, 2019.
2. RamezElmasri and ShamkantNavathe, Durvasula V L N Somayajulu, Shyam K Gupta, “Fundamentals of Database Systems”, Pearson Education, 2018.
3. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, “Database Systems The Complete Book” Prentice Hall, 2nd Edition, 2014.

Reference Books

1. Raghu Ramakrishna, Johannes Gehrke, “Database Management Systems”, McGraw Hill, 3rdEdition,2014.
2. G.K.Gupta,"Database Management Systems”, Tata McGraw Hill, 2011.
3. Date CJ, Kannan A, Swamynathan S, “An Introduction to Database System”, Pearson Education, 8thEdition,2006.
4. Paul Beynon-Davies, “Database Systems”, Palgrave Macmillan, 3rdEdition, 2003.
5. Mukesh Chandra Negi, “Fundamentals of Database Management Systems”, BPB Publications, 2019.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. http://dev.mysql.com/doc/
3. http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf
4. https://nptel.ac.in/courses/106/106/106106095/
5. https://www.tutorialspoint.com/dbms/index.htm

(In Computer Network Subject, reduce the “Routing Algorithms” concepts.)

A20CAT408	COMPUTER NETWORKS	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the basic concepts of Data Communications.
- To understand the functionalities and components involved in the physical layer.
- To learn the basic concepts of data link layer services and network layer communication protocols
- To understand various load characteristics and network traffic conditions, decide the transport protocols to be used.
- To analyze and compare the different protocols available in the application layer.

Course Outcomes

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

CO1 - Analyze the network components and network standards.
CO2 - Determine the Physical layer functionalities, Transmission modes and media**.**
CO3 - Analyze the Error correction and detection techniques and determine the proper usage of IP address, subnet mask and default gateway in a routed network.
CO4 - Describe, analyze and compare different protocols in transport layer**.**
CO5 - Analyze the functional working of different protocols of application layer**.**

UNIT I DATA COMMUNICATIONS (12Hrs)

Overview of Data Communications – Networks and its types – Network topologies. Transmission technologies: Signal Transmission – Digital signaling – Analog Signaling. Networks Models: Protocol Layering – OSI reference model – TCP/IP Protocol suite.

UNIT II PHYSICAL LAYER (12Hrs)

Physical layer functionalities – Analog to digital conversion using PCM, Transmission Modes: Parellel– Serial.Transmission Media: Guided and unguided media.Switching: Introduction. Circuit Switching and Packet switching Networks.

UNIT III DATA LINK LAYER AND NETWORK LAYER (12Hrs)

Data link layer services – Error Detection and Correction – Sliding window protocols – Network devices. Network layer functionality. Routing Algorithms: Shortest path algorithm, Distance vector routing – Subnetting – Network layer protocols: IPV4, IPV6.

UNIT IV TRANSPORT LAYER (12Hrs)

The Transport Services - Connection management – Transport layer Congestion Control – Transport Layer Protocols: User Datagram Protocol (UDP) – Transmission Control Protocol (TCP).

UNIT V APPLICATION LAYER (12Hrs)

Application Layer Protocols – HTTP – FTP – Telnet – Email (SMTP, POP3, IMAP, MIME) – DNS – Need for Cryptography and Network Security – Firewalls.

Text Books

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. Tanenbaum,A.S. and David J. Wetherall “Computer Networks”, 5th ed., Prentice Hall, 2011
3. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach: International Edition”, Pearson Education, Sixth edition, 2013.

Reference Books

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks- A system approach”, 5th edition, Elsevier, 2012.
2. Stallings, W., “Data and Computer Communications”, 10th Ed., Prentice Hall Int. Ed., 2013.
3. DayanandAmbawade, Deven Shah, "Advanced Compter Networks", Dreamtech Press, 1st edition, 2011.
4. PallapamanviV , "Data Communications and Computer Networks", PHI, 4th edition, 2014.
5. Andre S.Tanenbaum, "Computer Networks", Pearson Publication, 4th Edition, 2018.

Web References

1. https://www.geeksforgeeks.org/last-minute-notes-computer-network/
2. https://lecturenotes.in
3. https://www.cse.iitk.ac.in/users/dheeraj/cs425/
4. https://nptel.ac.in/courses/106/105/106105183/
5. https://nptel.ac.in/courses/106/105/106105081/

(Move the “Computer Graphics and Multimedia” course to DSE and bring the “Software Engineering” course as the DSC in Semester-IV.)

SEMESTER – IV										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CAT407	Data Base Management Systems	DSC	4	0	0	4	25	75	100
2	A20CAT408	Computer Networks	DSC	4	0	0	4	25	75	100
3	A20CAT409	Software Engineering	DSC	4	0	0	4	25	75	100
4	A20CAE4XX	Discipline Specific Elective– II	DSE	3	0	0	3	25	75	100
5	A20XXO4XX	Open Elective – II	OE	2	0	0	2	25	75	100
Practical										
6	A20CAL407	DBMS Lab	DSC	0	0	4	2	50	50	100
7	A20CAL408	Computer Networks Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20CAS404	Statistical Package for Social Sciences (SPSS)	SEC	0	0	2	2	100	0	100
Employment Enhancement Course										
9	A20CAC404	Mobile Application Development / RDBMS	EEC	-	-	4	-	100	-	100
							23	**425**	**475**	**900**

(In Computer Networks Lab course, try to conduct first 8 exercises using JAVA and remaining programs in CISCO models.)

		L	T	P	C	Hrs
A20CAL408	**COMPUTER NETWORKS LAB**	**0**	**0**	**4**	**2**	**30**

Course Objectives

- To gain and explore the basic concepts of Data Communications.
- To understand the signals and transmission media involved in the physical layer.
- To learn the basic concepts of data link layer services and network layer communication protocols
- To synthesize various load characteristics and network traffic conditions, decide the transport protocols to be used.
- To analyze and compare the different protocols available in the application layer and Network Security.

Course Outcomes

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

CO1 - Analyze the network components and network standards.
CO2 - Determine the Physical layer functionalities, Transmission media and Switching**.**
CO3-Analyze the Error correction and detection techniques and determine the proper usage of IP address, subnet mask and default gateway in a routed network
CO4 - Describe, analyze and compare different protocols in transport layer**.**
CO5 -Analyze the functional working of different protocols of application layer and Network Security**.**

List of Exercises

Implement the following exercises using JAVA:

1. Implementation of a socket program for Echo/Ping/Talk commands.
2. Creation of a socket between two computers and enable file transfer between them. Using (a.)TCP (b.) UDP
3. Implementation of a program for Remote Command Execution (Two M/Cs may be used).
4. Implementation of a program for CRC and Hamming code for error handling.
5. Writing a code for simulating Sliding Window Protocols.
6. Create a socket for HTTP for web page upload & Download.
7. Write a program for TCP module Implementation.(TCP services).
8. Write a program to implement RCP (Remote Capture Screen).

Implement the following exercises using CISCO Simulator:

9. Implementation (using NS2/Glomosim) and Performance evaluation of the following routing protocols:
    a. Shortest path routing
    b. Flooding
    c. Link State
    d. Hierarchical
10. Broadcast /Multicast routing.
11. Implementation of ARP.
12. Throughput comparison between 802.3 and 802.11.
13. Study of Key distribution and Certification schemes.
14. Design of an E-Mail system.
15. Implementation of Security Compromise on a Node.
16. Implementation of Various Traffic Sources.

Reference Books

1. AndrewS.Tanenbaum,"Computer Networks",Pearson Publication,4th Edition,2018.
2. Pallapamanvi. V ,"Data Communications and Computer Networks", PHI, 4th edition, 2014.
3. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach: International Edition”, Pearson Education, Sixth edition, 2013.
4. Stallings, W., “Data and Computer Communications”, 10th Ed., Prentice Hall Int. Ed., 2013.
5. DayanandAmbawade, Deven Shah,"Advanced Computer Networks", Dreamtech Press, 1st edition, 2011.

Web References

1. https://nptel.ac.in/courses/106/105/106105183/
2. https://nptel.ac.in/courses/106/105/106105081/
3. https://www.geeksforgeeks.org/last-minute-notes-computer-network/
4. https://lecturenotes.in
5. https://www.cse.iitk.ac.in/users/dheeraj/cs425/

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi and Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry

SCHOOL OF ARTS AND SCIENCE

BACHELOR OF COMPUTER APPLICATIONS

ACADEMIC REGULATIONS 2020

(R-2020)

CURRICULUM AND SYLLABI

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives toserve the society.

Mission

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: Research and Innovation:

To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT OF COMPUTATIONAL STUDIES

VISION AND MISSION

Vision:

To come up with successfully as a high-quality human capital in Computer Science and related areas for the sustainable growth of the IT industry needs of the country.

Mission:

M1: Innovative Skills:

Ensuring deeper understanding of fundamentals and acquiring innovative skills within core areas of Computer Science.

M2: Motivated Graduates:

Producing highly skilled and motivated graduates with the ability of problem solving individually and in teams.

M3: Ethical Responsibilities:

Providing a deep awareness of our ethical responsibilities to our profession and to the society.

STRUCTURE FOR UNDERGRADUATE PROGRAMME

Sl. No	Course Category	Breakdown of Credits
1	Language	6
2	English	6
3	Discipline Specific Core Courses (DSC)	84
4	Discipline Specific Elective Courses (DSE)	12
5	Inter-Disciplinary courses (IDC)	12
6	Skill Enhancement Courses (SEC)	12
7	Employability Enhancement Courses (EEC*)	-
8	Ability Enhancement Compulsory Courses (AECC)	4
9	Open Elective (OE)	4
10	Extension Activity (EA)	1
	Total	**141**

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

Sl.No	Course Category	Credits per Semester						Total Credits
		I	II	III	IV	V	VI	
1	Language Modern Indian Language (MIL)	3	3	-	-	-	-	6
2	English (ENG)	3	3	-	-	-	-	6
3	Discipline Specific Core Courses (DSC)	12	12	12	16	18	14	84
4	Discipline Specific Elective Courses (DSE)	-	-	3	3	3	3	12
5	Inter-Disciplinary courses (IDC)	4	4	4	-	-	-	12
6	Skill Enhancement Courses (SEC)	2	2	2	2	2	2	12
7	Employability Enhancement Courses (EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses (AECC)	2	2	-	-	-	-	4
9	Open Elective (OE)	-	-	2	2	-	-	4
10	Extension Activity (EA)	-	1	-	-	-	-	1
	Total	26	27	23	23	23	19	**141**

**** EEC will not be included for the computation of "Total of credits" as well as "CGPA" calculation***

SEMESTER – I										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20TAT101	Language – I	MIL	3	0	0	3	25	75	100
2	A20GET101	General English – I	ENG	3	0	0	3	25	75	100
3	A20CAT101	Problem Solving in C	DSC	4	0	0	4	25	75	100
4	A20CAT102	Digital Logic and Computer Organization	DSC	4	0	0	4	25	75	100
5	A20CAD101	Computational Mathematics	IDC	3	1	0	4	25	75	100
Ability Enhancement and Compulsory Course										
6	A20AET101	Environmental Studies	AECC	2	0	0	2	100	0	100
Practical										
7	A20CAL101	Programming in C Lab	DSC	0	0	4	2	50	50	100
8	A20CAL102	Digital system design Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
9	A20ENS101	Communication Skills	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
10	A20CAC101	Web Programming – HTML /CSS/Javascript	EEC	0	0	4	0	100	0	100
							26	**525**	**475**	**1000**

SEMESTER – II										
S. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20TAT202	Language-II	MIL	3	0	0	3	25	75	100
2	A20GET202	General English-II	ENG	3	0	0	3	25	75	100
3	A20CAT203	Data Structures and Algorithms	DSC	4	0	0	4	25	75	100
4	A20CAT204	Java Programming	DSC	4	0	0	4	25	75	100
5	A20CAD202	Numerical Methods andStatistics	IDC	3	1	0	4	25	75	100
Ability Enhancement and Compulsory Course										
6	A20AET202	Public Administration	AECC	2	0	0	2	100	0	100
Practical										
7	A20CAL203	Data Structures Lab	DSC	0	0	4	2	50	50	100
8	A20CAL204	Java Programming Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
9	A20CAS202	Quantitative Aptitude and Logical Reasoning	SEC	0	0	4	2	100	0	100
Extension Activities										
10	A20EAL201	National Service Scheme	EA	0	0	2	1	50	0	50
Employment Enhancement Course										
11	A20CAC202	Java Programming	EEC	0	0	4	0	100	0	100
							27	**575**	**475**	**1050**

SEMESTER – III										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CAT305	Operating Systems	DSC	4	0	0	4	25	75	100
2	A20CAT306	Python Programming	DSC	4	0	0	4	25	75	100
3	A20CAE3XX	Discipline Specific Elective – I	DSE	3	0	0	3	25	75	100
4	A20CAD303	Operation Research	IDC	3	1	0	4	25	75	100
5	A20XXO3XX	Open Elective – I	OE	2	0	0	2	25	75	100
Practical										
6	A20CAL305	Operating Systems Lab	DSC	0	0	4	2	50	50	100
7	A20CAL306	Python Programming Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20CAS303	Office Automation Tools	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20CAC303	Python Programming	EEC	0	0	4	0	100	0	100
							23	**425**	**475**	**900**

SEMESTER – IV										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CAT407	Data Base Management Systems	DSC	4	0	0	4	25	75	100
2	A20CAT408	Computer Networks	DSC	4	0	0	4	25	75	100
3	A20CAT409	Software Engineering	DSC	4	0	0	4	25	75	100
4	A20CAE4XX	Discipline Specific Elective– II	DSE	3	0	0	3	25	75	100
5	A20XXO4XX	Open Elective – II	OE	2	0	0	2	25	75	100
Practical										
6	A20CAL407	DBMS Lab	DSC	0	0	4	2	50	50	100
7	A20CAL408	Computer Networks Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20CAS404	Statistical Package for Social Sciences (SPSS)	SEC	0	0	2	2	100	0	100
Employment Enhancement Course										
9	A20CAC404	Mobile Application Development / RDBMS	EEC	-	-	4	-	100	-	100
							23	**425**	**475**	**900**

SEMESTER – V										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CAT510	Web Technology	DSC	4	0	0	4	25	75	100
2	A20CAT511	Data Warehousing and Mining	DSC	4	0	0	4	25	75	100
3	A20CAT512	Cloud Computing	DSC	3	0	0	3	25	75	100
4	A20CAT513	Artificial Intelligence	DSC	3	0	0	3	25	75	100
5	A20CAE5XX	Discipline Specific Elective–III	DSE	3	0	0	3	25	75	100
Practical										
6	A20CAL509	Web Technology Lab	DSC	0	0	4	2	50	50	100
7	A20CAP501	Mini Project	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20CAS505	Internship (2-weeks) / In-plant	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20CAC505	ARDUINO/IOT	EEC	0	0	4	0	100	0	100
							23	**425**	**475**	**900**

SEMESTER – VI										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CAT614	Block chain Technology	DSC	**3**	0	0	3	25	75	100
2	A20CAT615	Internet of Things and Data Analytics	DSC	**3**	0	0	3	25	75	100
3	A20CAT616	.Net Framework	DSC	**3**	0	0	3	25	75	100
4	A20CAE6XX	Discipline Specific Elective –IV	DSE	**3**	0	0	3	25	75	100
Practical										
5	A20CAP602	Project Work& Viva-voce	DSC	**0**	0	10	5	40	60	100
Skill Enhancement Course										
6	A20CAS606	Technical Seminar and Report Writing	SEC	**0**	0	4	2	100	0	100
Employment Enhancement Course										
7	A20CAC606	Data science/Machine Learning	EEC	0	0	4	0	100	0	100
							19	**340**	**360**	**700**

Discipline Specific Electives are to be selected from the list given in Annexure I

***** Open electives are to be selected from the list given in Annexure II***

Annexure – I
DISCIPLINE SPECIFIC ELECTIVE COURSES

ELECTIVES										
Sl. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Discipline Specific Elective (DSE - I) – offered in Third Semester										
1	A20CAE301	Computer Graphics and Multimedia	DSE	3			3	25	75	100
2	A20CAE302	Object Oriented Analysis and Design	DSE	3	-	-	3	25	75	100
3	A20CAE303	Client / Server Technology	DSE	3	-	-	3	25	75	100
Discipline Specific Elective (DSE - II) – offered in Fourth Semester										
1	A20CAE404	Hadoop for Data Science	DSE	3	-	-	3	25	75	100
2	A20CAE405	Data Science with R language	DSE	3	-	-	3	25	75	100
3	A20CAE406	Data Visualization using MATLAB	DSE	3	-	-	3	25	75	100
Discipline Specific Elective (DSE - III) – offered in Fifth Semester										
1	A20CAE507	Introduction to Robotics	DSE	3	-	-	3	25	75	100
2	A20CAE508	Recommender Systems	DSE	3	-	-	3	25	75	100
3	A20CAE509	Reinforcement learning	DSE	3	-	-	3	25	75	100
Discipline Specific Elective (DSE - IV) – offered in Sixth Semester										
1	A20CAE610	Information Security	DSE	3	-	-	3	25	75	100
2	A20CAE611	Network Security	DSE	3	-	-	3	25	75	100
3	A20CAE612	Ethical Hacking	DSE	3	-	-	3	25	75	100

Annexure – II
OPEN ELECTIVE COURSES
COMPLETE LIST OF OPEN ELECTIVES OFFERED BY ALL THE DEPARTMENTS

Open Elective – I (Offered in Semester III)				
S. No	Course Code	Course Title	Offering Department	Permitted Departments
1	A20CHO301	Water Analysis (Practical)	Chemistry	Computational Studies, Mathematics, Physics
2	A20CHO302	Food Analysis (Practical)	Chemistry	Computational Studies, Mathematics, Physics
3	A20CHO303	Molecules of Life (Practical)	Chemistry	Computational Studies, Mathematics, Physics
4	A20CMO304	Fundamentals of Accounting and Finance	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
5	A20CMO305	Fundamentals of Management	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics.

6	A20CMO306	Fundamentals of Marketing	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics.
7	A20CMO307	Essential Legal Knowledge	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics.
8	A20CPO308	Programming in C	Computational Studies	Commerce and Management, Mathematics, Media Studies.
9	A20CPO309	Digital Logic Fundamentals	Computational Studies	Mathematics, Physics.
10	A20CPO310	Data Structures	Computational Studies	Mathematics
11	A20CPO311	Programming in Python	Computational Studies	Commerce and Management, Mathematics, Media Studies
12	A20CPO312	Office Automation Tools	Computational Studies	Chemistry, Commerce and Management, English, Mathematics, Media Studies, Physics
13	A20ENO313	Interpersonal Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	A20ENO314	Fine-tune your English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	A20ENO315	Conversational Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	A20MAO316	Quantitative Aptitude - I	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
17	A20MAO317	Operation Research	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
18	A20MAO318	Statistical Methods	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
19	A20JMO319	Graphic Design	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	A20JMO320	Role of social media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	A20VCO321	Event Management	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	A20VCO322	Online Journalism	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
23	A20PHO323	Geo Physics	Physics	Chemistry, Mathematics and Computer Science
24	A20PHO324	Physics of Material and Devices	Physics	Chemistry, Mathematics and Computer Science
25	A20PHO325	Statistical Physics	Physics	Chemistry, Mathematics and Computer Science

Open Elective – II (Offered in Semester IV)				
S. No	**Course Code**	**Course Title**	**Offering Department**	**Permitted Departments**
1	A20CHO401	C++ Programming and its Application to Chemistry	Chemistry	Computational Studies, Mathematics, Physics
2	A20CHO402	Instrumental Methods of Analysis	Chemistry	Computational Studies, Mathematics, Physics
3	A20CHO403	Computational Chemistry Practical	Chemistry	Computational Studies, Mathematics, Physics
4	A20CMO404	Practical Banking	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
5	A20CMO405	Essential Insurance Knowledge	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
6	A20CMO406	Income Tax Computation and Filing	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
7	A20CMO407	Mutual Fund Investment	Commerce and Management	Chemistry, Computational Studies, English, Media Studies, Mathematics, Physics
8	A20CAO408	Database Management Systems	Computational Studies	Commerce and Management, Media Studies, Mathematics
9	A20CAO409	Web Development	Computational Studies	Commerce and Management, Media Studies, Mathematics
10	A20CAO410	Software Engineering	Computational Studies	Commerce and Management, Media Studies, Mathematics
11	A20CAO411	Computer Graphics and Multimedia	Computational Studies	Media Studies, Mathematics
12	A20CAO412	Introduction to Data Science using Python	Computational Studies	Chemistry, Commerce and Management, English, Media Studies, Mathematics, Physics
13	A20ENO413	Functional Writing in English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	A20ENO414	Creative Writing	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	A20ENO415	English for Competitive Exam	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	A20MAO416	Discrete mathematics	Mathematics	Chemistry, Computational Studies, Physics
17	A20MAO417	Quantitative Aptitude - II	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics
18	A20VCO418	Video Editing	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
19	A20VCO419	Writing for media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	A20JMO420	Media and Politics	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics

21	A20JMO421	Basics of News Reporting	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	A20PHO422	C++ Programming and its Application to Physics	Physics	Chemistry, Computational Studies, Mathematics
23	A20PHO423	Communication electronics	Physics	Chemistry, Computational Studies, Mathematics
24	A20PHO424	Digital Electronics	Physics	Chemistry, Computational Studies, Mathematics

மொழித்தாள்

தமிழ் - I

(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாடப்பிரிவுகளுக்குமான பொதுத்தாள்)

	L	T	P	C	Hrs
A20TAT101	3	0	0	3	45

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றை காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- மொழியின் கட்டமைப்பைப் புரிந்துகொள்வதற்கு ஏதுவாக பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.
- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.
- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1- இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.
CO2 - நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.
CO3 - தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.
CO4 - தாய்மொழியின் சிறப்பை அறிதல்.
CO5 - இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு–1 **(9 Hrs)**

இக்காலக் கவிதைகள்–1

1. பாரதியார் – கண்ணன் என் சேவகன்
2. பாரதிதாசன் – தமிழ்ப்பேறு
3. அப்துல் ரகுமான் – அவதாரம்
4. மீரா – கனவுகள் + கற்பனைகள் = காகிதங்கள்
5. து.நரசிம்மன் – மன்னித்துவிடு மகனே

அலகு–2 **(9 Hrs)**

இக்காலக் கவிதைகள்–2

1. ராஜா சந்திரசேகர் – கைவிடப்பட்ட குழந்தை
2. அனார் – மேலும் சில இரத்தக் குறிப்புகள்
3. சுகிர்தராணி – அம்மா
4. நா.முத்துக்குமார் – தூர்

அலகு–3 **(9 Hrs)**

சிற்றிலக்கியங்கள்

1. கலிங்கத்துப் பரணி – பொருதடக்கை வாள் எங்கே... (பாடல்–485)
2. அழகர்கிள்ளைவிடு தூது – இதமாய் மனிதருடனே...(பாடல்–45)
3. நந்திக் கலம்பகம் – அம்பொன்று வில்லொடிதல்...(பாடல்–77)
4. முக்கூடற் பள்ளு – பாயும் மருதஞ் செழிக்கவே...(பாடல்–47)
5. குற்றாலக் குறவஞ்சி – ஓடக் காண்பதுமே...(பாடல்–9)

காப்பியங்கள்

மணிமேகலை–உலகறவி புக்க காதை– 'மாசுஇல் வால்ஒளி! – இந்நாள் போலும் இளங்கொடி கெடுத்தனை'.(28–அடிகள்)

அலகு-4 **(9 Hrs)**

தமிழ் இலக்கிய வரலாறு

1. சிற்றிலக்கியம்- தோற்றமும் வளர்ச்சியும்
2. புதுக்கவிதை- தோற்றமும் வளர்ச்சியும்
3. சிறுகதை -தோற்றமும் வளர்ச்சியும்
4. புதினம் -தோற்றமும் வளர்ச்சியும்
5. உரைநடை - தோற்றமும் வளர்ச்சியும்

அலகு 5 **(9 Hrs)**

மொழிப்பயிற்சி

1. கலைச்சொல்லாக்கம்
2. அகரவரிசைப்படுத்துதல்
3. மரபுத்தொடர்/பழமொழி
4. கலை விமர்சனம்
5. நேர்காணல்

உரைநடைப் பகுதி

1. உ.வே.சாமிநாதையர் - சிவதருமோத்திரச் சுவடி பெற்ற வரலாறு.
2. தஞ்சாவூர் - கூஜாவின் கோபம்.
3. இரா. பச்சியப்பன் - மாடல்ல மற்றையவை.

பார்வை நூல்கள்

1. கைலாசபதி, க., தமிழ் நாவல் இலக்கியம், குமரன் பதிப்பகம், வடபழனி, 1968.
2. சுந்தரராஜன், பே.கோ. சிவபாதசுந்தரம். சோ., தமிழில் சிறுகதை வரலாறும் வளர்ச்சியும், க்ரியா, சென்னை, 1989.
3. பரந்தாமனார், அ.கி., நல்ல தமிழ் எழுத வேண்டுமா, பாரி நிலையம், சென்னை, 1998.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.எச். பதிப்பகம், சென்னை, 2011.
5. வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், அன்னம், சிவகங்கை, 1992.

உரைநடை நூல்கள் :

1. சக்திவேல், சு., தமிழ் மொழி வரலாறு, மாணிக்கவாசகர் பதிப்பகம், சிதம்பரம், 1988.
2. சிற்பி பாலசுப்ரமணியம் மற்றும் நீலபத்மநாபன், புதிய தமிழ் இலக்கிய வரலாறு, தொகுதி-1, 2, 3, சாகித்திய அகாதமி, புதுடெல்லி,2013.
3. பாரதியார், பாரதியார் கவிதைகள், குமரன் பதிப்பகம், சென்னை, 2011.

இணையத்தளங்கள் :

http://www.tamilkodal.com
http://www.languagelab.com
http://www.tamilweb.com

A20GET101	GENERAL ENGLISH I (Common to B.A., B.C.A. and B.Sc.)	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To recognize the rhythms, metrics and other musical aspects of poetry
- To read a variety of texts critically and proficiently
- To enable the students to enjoy the flair of literature through the work of great writer
- To make the students to know the functions of basic grammar and frame sentences without grammatical error
- To enable them understanding the intrinsic nuances of writing in English language

Course Outcomes

After the completion of this course, the students will be able to

CO1 - Comprehend and discuss the various facets of selected poems.
CO2 - Analyze and interpret texts written in English.
CO3 - Read drama with graduate-level interpretive and analytical proficiency.
CO4 - Improve the fluency and formation of grammatically correct sentence.
CO5 - Enhance the writing skills for specific purposes.

UNIT I POETRY **(9 Hrs)**

1. John Milton: On His Blindness
2. William Wordsworth: Daffodils
3. Percy Bysshe Shelly: Ozymandias
4. Emily Dickinson: Because I could not stop for Death
5. Sarojini Naidu: The Queen's Rival

UNIT II PROSE **(9 Hrs)**

1. Francis Bacon: Of Love
2. Charles Lamb: A Dissertation upon Roast Pig

UNIT III DRAMA **(9 Hrs)**

1. Oscar Wilde: Lady Windermere's Fan

UNIT IV GRAMMAR **(9 Hrs)**

1. Parts of Speech
2. Tenses
3. Subject-Verb Agreement

UNIT V COMPOSITION **(9 Hrs)**

1. Essay Writing
2. Email

Text Books

1. “Brookside Musings: A Selection of Poems and Short Stories: Board of Editors”, Orient Longman Limited, 2009
2. Wilde Oscar, “Lady Windermere's Fan. Published in The Importance of Being Earnest and Other Plays” London: Penguin, 1940. ISBN 0-14-048209-1.
3. Gale, Emily Dickinson’s Because I could not stop for Death, Cengage Learning, 2015

Reference Books

1. Lalitha Natarajan and Sasikala Natesan, "English for Excellence: Poetry”, Anuradha Publications, 2015
2. “Literary Pursuits: Board of Editors”, Orient Longman Limited, 2015
3. “Literary Pinnacles: An Anthology of Prose and Poetry. Board of Editors”, Orient Longman Limited, 2015
4. “The Approach to Life: A Selection of English Prose”, Orient Longman Limited, 2009
5. JeetThayil,” 60 Indian Poets”, Penguin Books, 2008

Web References

1. https://poets.org/poem/because-i-could-not-stop-death-479
2. https://www.enotes.com/topics/an-astrologers-day
3. https://www.poetryfoundation.org/poems/46565/ozymandias
4. https://www.dltk-holidays.com/spring/poem/daffodils.htm
5. https://www.bartleby.com/4/313.html

A20CAT101	PROBLEM SOLVING USING C (Common to B.Sc. CS and B.C.A)	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the Fundamentals of Computers and introduction to C language.
- To study the basic terminologies of C language and arrays
- To understand the Functions, Structures and Unions.
- To understand the concepts of Pointers.
- To study about File Management Operations in C.

Course Outcomes

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

CO1 – Develop simple applications in C using basic constructs.
CO2 – Incorporating the use of sequential, selection and repetition control structures into a program.
CO3 – Develop simple programs using functions, structures and unions.
CO4 – Design and develop programs using Pointers.
CO5 – Understand the File management Operations and Pre-processor Directives.

UNIT I INTRODUCTION TO C (12 Hrs)

Fundamentals of Computer: Computer Definition – Block Diagram of Computer – Types of Computer – Characteristics of Computer – Applications of Computer. C programming: Overview of C – Constants – Compiling a C Program - Variables and Data Types-Technical Difference between Keywords and Identifiers-Types of C Qualifiers and format specifies - Operators and Expressions-Operators Precedence-Type conversion-Input-Output Statements.

UNIT II DECISION MAKING (12 Hrs)

Decision making and branching - Relational operators – Logical operators – if – if else-if else if –nested if, Switch-case.

UNIT III LOOPING AND ARRAYS (12 Hrs)

Looping: while - do while – for – break – continue - nested loop. Arrays: One Dimensional Arrays-Two-DimensionalArrays-Multi-Dimensional Array-Dynamic arrays-Character Arrays and String-Sorting - Searching.

UNIT IV FUNCTIONS, POINTERS (12 Hrs)

Functions: Introduction - Definition – Declaration – Categories of Functions - Nesting of Functions, Recursive functions - Passing Arrays to Functions - Strings – String library function. Pointers: Introduction - Declaring Pointer Variables - Initialization of Pointer Variables - Accessing the address of a variable - Accessing a variable thorough Pointer - Chain of Pointers - Pointer Expressions - Pointers and arrays — Pointers and functions — Call by Reference - Pointers andcharacter strings - Array of Pointers - Pointers and Structures.

UNIT V STRUCTURES AND UNIONS, FILE MANAGEMENT (12 Hrs)

User defined data types: Introduction – Structure: definition - declaration - Arrays of Structures – Nested structures –Passing structures to functions – Union - Enumeration and Typedef. Introduction to File Handling in C, Input and Output operations on a file – Error Handling - Random access to files – command line arguments. Introduction to pre- processor — Macro substitution directives — File inclusion directives — conditional compilation directives — Miscellaneous directives.

Text Books

1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, 8th Edition, 2019.
2. Byron S Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing Company,4th Edition, New Delhi, 2015.
3. Herbert Schildt,” C: The Complete Reference”, McGraw Hill, 4th Edition, 2014.
4. YashwantKanetkar, “Let us C”, BPB Publications, 16th Edition, 2017.
5. Archana Kumar, “Computer Basics with Office Automation”, Dreamtech Press – Wiley Publisher, 2019.
6. ReemaThareja, “Fundamentals of Computing & C Programming” Oxford University Press, 2012.

Reference Books

1. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2012.
2. VikasVerma, “A Workbook on C “, Cengage Learning, 2rd Edition, 2012.
3. Dr. P. Rizwan Ahmed, “Office Automation”, Margham Publications, 2016.
4. P.Visu, R.Srinivasan and S.Koteeswaran, “Fundamentals of Computing and Programming”, 4th Edition, Sri Krishna Publications, 2012.
5. PradipDev, ManasGhoush, “Programming in C”, 2rd Edition, Oxford University Press, 2011.

Web References

1. https://www.programiz.com/c-programming
2. https://www.geeksforgeeks.org/c-language-set-1-introduction/
3. https://www.tutorialspoint.com/cprogramming
4. https://www.assignment2do.wordpress.com/.../solution-programming-in-ansi-c
5. https://nptel.ac.in/courses/106/104/106104128/
6. https://www.coursera.org/courses?query=c%20programming
7. https://www.udemy.com/course/c-programming-for-beginners-/

A20CAT102	DIGITAL LOGIC AND COMPUTER ORGANIZATION (Common to B.Sc. CS and B.C.A)	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives:

- To understand the basic concepts of Digital design and number systems.
- To expose with the Combinational circuits
- To expose with the Sequential circuits
- To study the fundamentals of Computer systems.
- To be familiar with the memory organization and CPU in a computer systems.

Course Outcomes:

After the completion of this course, the students will be able to:

CO1 – Explain the concepts of Digital design and number systems.
CO2 – Design the digital system using combinational system design.
CO3 – Design the digital system using Sequential system design.
CO4 – Explain fundamentals of Computer systems.
CO5 – Explain memory organization and CPU in a computer system.

UNIT I INTRODUCTION TO DIGITAL DESIGN (12 Hrs)

Data Representation - Data Types - Number Systems - Complements - Arithmetic Operations - Representations - Fixed Point, Floating Point - Error detection codes - Binary Codes- Logic Gates - Boolean Algebra - Map Simplification- Karnaugh maps: SOP and POS forms - QuineMcClusky method

UNIT II COMBINATIONAL CIRCUIT DESIGN (12 Hrs)

Combinational Circuits, Half adder - full adder - code converters - combinational circuit design - Multiplexers and demultiplexers – encoders – decoders - Combinational design using MUX and DE-MUX.

UNIT III SEQUENTIAL CIRCUIT DESIGN (12 Hrs)

Sequential Circuit Design, Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T) - Counters - Shift registers and their types - Counters: Synchronous and Asynchronous counters.

UNIT IV COMPUTER ORGANIZATION (12 Hrs)

Instruction Codes - Computer Registers - Computer Instructions - Timing And Control - Instruction Cycle - Memory Reference Instructions - I/O And Interrupt — Machine Language — Assembly Language - Assembler -. Peripheral Devices - Input-Output Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt - DMA - IOP - Serial Communication

UNIT V MEMORY ORGANIZATION AND CPU (12 Hrs)

Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Memory Management Hardware - CPU: General Register Organization - Control Word - Stack Organization - Instruction Format - Addressing Modes - Data Transfer And Manipulation - Program Control.

Text Books

1. Morris Mano M, “Digital Logic and Computer Design”, Pearson Education, 4th edition, 2014
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, “Computer Organization”, 5 th edition, McGraw Hill, 2002.
3. V.Rajaraman, T. Radhakrishnan, “Digital Logic and Computer Design”, PHI Learning, 2006.

Reference Books

1. B Ram,Computer Fundamentals: Architecture and Organization (TWO COLOUR EDITION), New Age International (P) Ltd Publishers, 6th Edition 2020.
2. FLOYD, Digital Fundamentals, PEARSON INDIA, 11th Edition.
3. Alan B. Marcovitz, “Introduction to Logic design”, Tata Mcgraw Hill, 2rd Edition, 2005.

Web References

1. https://www.sanfoundry.com/best-reference-books-computer-organization-architecture/
2. http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf
3. https://www.tutorialspoint.com/computer_logical_organization/index.htm

A20CAD101	COMPUTATIONAL MATHEMATICS (Common to B.Sc. CS and B.C.A.)	L	T	P	C	Hrs
		4	0	0	4	60

Course objectives

- To develop the use of matrix algebra techniques for practical applications.
- To introduce effective mathematical tools for the solutions of differential equations that model physical processes.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To learn the different concepts of topics in Probability.
- To learn the different concepts of topics in statistics.

Course Outcomes

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

CO1 – Acquire the knowledge about matrices and able to compute Eigen values and Eigen.
CO2 – Analyze and solve Differential Equations.
CO3 – Understand the use of Integrals and able to apply it.
CO4 – Understand the use probability.
CO5 – Understand the use Statistics.

UNIT I MATRICES (12 Hrs)

Rank of a Matrix- Consistency of system of equations. Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigenvectors. Cayley - Hamilton Theorem - Diagonalization of matrices- Reduction of a quadratic form to canonical form by orthogonal transformation - Nature of quadratic forms.

UNIT II DIFFERENTIAL EQUATIONS (12 Hrs)

Linear differential equations of higher order - with constant coefficients, the operator D, Euler's linear equation of higher order with variable coefficients, simultaneous linear differential equations, solution by variation of parameters method

UNIT III INTEGRALS AND APPLICATIONS (12 Hrs)

Double Integrals and Triple Integrals. Applications: Areas by double integration and volumes by triple integration.

UNIT IV PROBABILITY (12 Hrs)

Discrete Random variable: Introduction Random variables and their event spaces The probability Mass function. Distribution functions Special discrete distributions: The Bernoulli PMF. Bernoulli Poisson, continuous random variablenormal distribution.

UNIT V STATISTICS (12 Hrs)

Measures of central tendency Arithmetic mean, Median, Mode, Geometric mean, Harmonic mean. Skewness and Kurtosis - Simple correlation Karl Pearson's coefficient. of correlation Rank correlation Regression lines of regression properties of regression coefficient.

Text Books

1. M.K. Venkataraman, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, 2001.
2. M.K. Venkataraman, Engineering Mathematics (Third Year-Part A), The National Publishing
3. Company, Madras, 2001.
4. 3. T. Veerarajan, - Probability, statistics and Random Processes,‖ Tata Mc.Graw-Hill Publishing Company Ltd.,3rd Edition, 2008.

Reference Books

1. N.P. Bali and Manish Goyal, “A Text Book of Engineering Mathematics”, Lakshmi Publications, New Delhi, 2007.
2. Grewal B.S.,” Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 41st Edition, 2011.
3. Veerarajan T., “Engineering Mathematics for first year”, Tata McGraw-Hill, New Delhi, 2008
4. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. Erwin Kreyszig, “Advanced Engineering Mathematics”, John Wiley & Sons, New Delhi.

Web References

1. https://www.youtube.com/watch?v=xyAuNHPsq-g
2. https://link.springer.com/chapter/10.1007/978-1-4757-2024-2_1
3. https://ncert.nic.in/ncerts/l/lemh203.pdf
4. https://users.math.msu.edu/users/gnagy/teaching/ode.pdf
5. https://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf
6. https://www.math.arizona.edu/~jwatkins/statbook.pdf
7. http://www.utstat.toronto.edu/mikevans/jeffrosenthal/book.pdf
8. https://homepage.divms.uiowa.edu/~rdecook/stat2020/notes/ch3_pt1.pdf

A20AET101	ENVIRONMENTAL STUDIES (Common for all B.A., B.Sc., B.Com., B.B.A, B.C. A.)	L	T	P	C	Hrs
		2	0	0	2	30

Course Objectives

- To gain knowledge on the importance of natural resources and energy.
- To know the structure and function of an ecosystem
- To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation andappreciate the concept of interdependence
- To know the causes of types of pollution and disaster management
- To observe and discover the surrounding environment through field work.

Course Outcomes

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

CO1 – Understand about the various resources
CO2 – Learn about the biodiversity
CO3 – Learn the different types of pollution and to prevent the pollution
CO4 – Know about the pollution Act
CO5 – Observe various environmental issues in surroundings

UNIT I INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES (6 Hrs)

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT II ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION (6 Hrs)

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem. Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) andlocal levels - Hotspots, threats to biodiversity - conservation of biodiversity – Insitu & Exsitu.

UNIT III ENVIRONMENTAL POLLUTION AND MANAGEMENT (6 Hrs)

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution - pollution case studies.

UNIT IV SOCIAL ISSUES - HUMAN POPULATION (6 Hrs)

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forestconservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT V FIELD WORK (6 Hrs)

Visit to a local area / local polluted site / local simple ecosystem - Report submission REFERENCES

Text Books

1. BharuchaErach, “Textbook of Environmental Studies for Undergraduate Courses”, Telangana, India:Orient Black Swan, 2rd Edition, 2013.
2. BasuMahua, Savarimuthu Xavier, “SJ Fundamentals of Environmental Studies”. Cambridge,United Kingdom: Cambridge University Press, 2017.
3. Agarwal, K.C “Environmental Biology”, Nidi Publ. Ltd. Bikaner, 2001 .

Reference Books

1. Kumarasam.K., A. Alagappa Moses AND M.Vasanthy, “Environmental studies”, Bharathidasan university pub, 1, trichy2004.
2. Rajamannar, “Environmental studies”, EVR College PUB, Trichy 2004.
3. Kalavathy, S. (ED.),“Environmental Studies”, Bishop Heber College PUB., Trichy 2004.

Web References

1. https://www.youtube.com/watch?v=78prsPYm98g
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2792934/
3. https://www.frontiersin.org/articles/505570

A20CAL101	PROGRAMMING IN C LAB (Common to B. Sc. CS and B.C.A)	L	T	P	C	Hrs
		0	0	4	2	60

Course Objectives

- To practice the fundamental programming methodologies in the C programming language.
- To apply logical skills for problem solving using control structures and arrays.
- To design, implement, test and debug programs that use different data types, variables, strings, arrays, pointers and structures.
- To design modular programming and provide recursive solution to problems.
- To understand the miscellaneous aspects of C and comprehension of file operations.

Course Outcomes

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

CO1 – Apply and practice logical formulations to solve simple problems leading to specific applications.
CO2 – Develop C programs for simple applications making use of basic constructs, arrays and strings.
CO3 – Develop C programs involving functions, recursion, pointers, and structures.
CO4 – Design applications using sequential and random access file processing.
CO5 – Build solutions for online coding challenges.

List of Exercises

1. Simple programming exercises to familiarize the basic C language constructs.
2. Develop programs using identifiers and operators.
3. Develop programs using decision-making and looping constructs.
4. Develop programs using functions as mathematical functions.
5. Develop programs with user defined functions – includes parameter passing.
6. Develop program for one dimensional and two dimensional arrays.
7. Develop program to illustrate pointers.
8. Develop program with arrays and pointers.
9. Develop program for dynamic memory allocation.
10. Develop programs for file operations.

Reference Books

1. Zed A Shaw," Learn C the Hard Way: Practical Exercises on the Computational Subjects You KeepAvoiding (Like C)", Addison Wesley, 2016.
2. Anita Goel and Ajay Mittal, "Computer Fundamentals and programming in C", 1st Edition, PearsonEducation , 2011.
3. Yashwanth Kanethkar, "Let us C", 13th Edition, BPB Publications, 2008.
4. Maureen Sprankle, Jim Hubbard," Problem Solving and Programming Concepts," 9th Edition, Pearson,2011.

Web References

1. https://alison.com/course/introduction-to-c-programming
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://cad-lab.github.io/cadlab_data/files/1993_prog_in_c.pdf
4. https://www.tenouk.com/clabworksheet/clabworksheet.html
5. https://fresh2refresh.com/c-programming/
6. http://www.skiet.org/downloads/cprogrammingquestion.pdf

		L	T	P	C	Hrs
A20CAL102	**DIGITAL LAB** **(Common to B.Sc. CS and B.C.A.)**	**0**	**0**	**4**	**2**	**60**

Course Objectives

- To acquire knowledge about basic logic gates.
- To develop the skills in writing assembly programs.
- To develop the skill for error corrections in the micro level.
- To design and analyze combinational logic circuits.
- To expose with the Sequential circuits

Course Outcomes

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

CO1 – Acquire knowledge about basic logic gates.
CO2 – Develop the skills in writing assembly programs.
CO3 – Develop the skill for error corrections in the micro level.
CO4 – Design Combinational Logic Circuits.
CO5 – Design Sequential Logic Circuits.

List of Exercises

1. Study of Integrated Circuits and their working Logics.
2. Verification of Boolean Theorems using Digital Logic Gates.
3. Design and Implementation of Combinational Circuits using Basic Gates Code Converters.
4. Design and Implementation of 4-Bit Binary Adder / Subtractor using Basic Gates and MSI Devices
5. Design and Implementation of Parity Generator / Checker using Basic Gates and MSI Devices.
6. Design and Implementation of Magnitude Comparator.
7. Design and Implementation of Application using Multiplexers/Demultiplexers.
8. Design and Implementation of Shift Registers.
9. Design and Implementation of Synchronous and Asynchronous Counters.
10. Design and Implementation of Johnson and Ring Counters.

Reference Books

1. Albert Paul Malvino, Donald P Leach, Digital principles and applications, TMH, 2007.
2. Hayes J. P., “Computer Architecture & Organisation”, McGraw Hill,
3. Hamacher, “Computer Organisation and System Software”, EXCEL BOOKS.
4. Ghosh & Pal, Computer Organization & Architecture (TMH WBUT Series), TMH.

Web References

1. www.geeksforgeeks.org › computer-organization-and-architecture
2. www.javatpoint.com › computer-organization-and-architecture-tutorial
3. www.geeksforgeeks.org › digital-electronics-logic-design-tutorials

A20ENS101	COMMUNICATION SKILLS LAB (Common to all B.A., B.Sc., B.Com., B.B.A., B.C.A.)	L	T	P	C	Hrs
		0	0	2	2	30

Course Objectives

- To improve the students' speed in reading.
- To decode the correspondence between sound and spelling in English.
- To train students to organize, revise and edit ideas to write clearly and effectively.
- To enhance the sense of social responsibility and accountability of the students.
- To expound the significance of time and stress management.

Course Outcomes

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

CO1 – Understand the pattern to communicate effectively.
CO2 – Impart Speaking skills with confidence.
CO3 – Use writing strategies to improve their drafting skills and comprehending of articles.
CO4 – Demonstrate leadership qualities to Participate in Group Discussion and Interview efficiently.
CO5 – Expertise in Managerial skills.

UNIT I COMMUNICATION SKILLS SPEAKING (6 Hrs)

Aspects of speaking - Process and techniques of effective speech - Presentations- topic to be given to students for short speech.

UNIT II SELF - MANAGEMENT SKILLS (6 Hrs)

Time Management - Stress management – Perseverance – Resilience - Mind mapping – Self- confidence

UNIT III COMMUNICATION SKILL - READING (6 Hrs)

Phonics - Self- Introduction - Vocabulary - Comprehension - Skimming and Scanning.

UNIT IV SOCIAL SKILLS (6 Hrs)

Negotiation and Persuasion – Leadership - Teamwork - Problem Solving - Empathy - Decision Making.

UNIT V COMMUNICATION SKILL - WRITING (6 Hrs)

Descriptive – Narrative – Persuasive – Expository – Picture composition

Text Books

1. Syamala, V," Effective English Communication for you", Chennai: Emerald Publishers, 2002
2. Balasubramanian, T," A Textbook of English Phonetics for Indian Students",New Delhi: Trinity Press 1981.
3. Sardana, C.K.," The Challenge of Public Relations", New Delhi: Har- Anand Publications,1995.

Reference Books

1. Morley, David and Philip Neilson, editors", The Cambridge Companion to Creative Writing", Cambridge: 2012.
2. Eastwood, John, "Oxford Grammar", Oxford University Press, 1999.
3. Prasad, Hari Mohan," A Handbook of Spotting Errors:" McGraw Hill Education, 2010.
4. Murphy, John J, "Pulling Together: 10 Rules for High-Performance Teamwork",Simple Truths, 2016.

Web References

1. www.softwaretestinghelp.com › how-to-crack-the-gd
2. www.businessballs.com › communication-skills › prese...
3. www.teachingenglish.org.uk › article › public-speaking...
4. www.teachingenglish.org.uk › article › public-speaking...
5. www.monster.com › career-advice › article › boost-you...

மொழித்தாள்

தமிழ் - II

(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாடப்பிரிவுகளுக்குமான பொதுத்தாள்)

	L	T	P	C	Hrs
A20TAT202	3	0	0	3	45

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள்,அடையாளங்கள் ஆகியவற்றை காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- மொழியின் கட்டமைப்பைப் புரிந்துகொள்வதற்கு ஏதுவாக பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.
- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.
- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1 – இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.
CO2 – நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.
CO3 – தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.
CO4 – தாய்மொழியின் சிறப்பை அறிதல்.
CO5 – இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு-1 **(9 Hrs)**

1. எட்டுத்தொகை: 1.குறுந்தொகை (படல்-130) 2. நற்றிணை (பாடல்-27) 3. அகநானூறு (பாடல்-86).
2. பத்துப்பாட்டு: சிறுபாணாற்றுப்படை (அடிகள்-126-143).
3. பதினெண் கீழ்க்கணக்கு: திருக்குறள்- வெகுளாமை (அதிகாரம்-31), காதல் சிறப்புரைத்தல் (அதிகாரம்-113).

அலகு-2 **(9 Hrs)**

1. எட்டுத்தொகை: 1. ஐங்குறுநூறு (பாடல்-203), 2. கலித்தொகை- பாலைத்திணை (பாடல்-9), 3. புறநானூறு (பாடல்-235).
2. பத்துப்பாட்டு- முல்லைப்பாட்டு (6-21).
3. பதினெண் கீழ்க்கணக்கு :
    1. நாலடியார் – நல்லார் எனத்தான் (221) .
    2. திரிகடுகம்- கோலஞ்சி வாழும் குடியும் (33).
    3. இனியவை நாற்பது- குழவி தளர்நடை (14).
    4. கார் நாற்பது- நலமிகு கார்த்திகை (26).
    5. களவழி நாற்பது-கவளங்கொள் யானை (14).

அலகு-3 **(9 Hrs)**

சைவம்- பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர்	–	வேயுறு தோளிபங்கன் (இரண்டாம் திருமுறை).
2. திருநாவுக்கரசர்	–	மனமெனும் தோணி (நான்காம் திருமுறை).
3. சுந்தரர்	–	ஏழிசையாய் இசைப்பயனாய் (ஏழாம் திருமுறை).
4. மாணிக்கவாசகர்	–	ஆதியும் அந்தமும் இல்லா (திருவெம்பாவை).
5. திருமூலர்	–	அன்பு சிவம் இரண்டு (திருமந்திரம்).

வைணவம் – நாலாயிரத் திவ்வியப் பிரபந்தம்

1. பேயாழ்வார்	–	திருக்கண்டேன் பொன்மேனி....
2. பெரியாழ்வார்	–	கருங்கண் தோகை மயிற் பீலி....
3. தொண்டரடிப்பொடிஆழ்வார்	–	பச்சைமாமலை போல்....
4. ஆண்டாள்	–	கருப்பூரம் நாறுமோ? கமலப்பூ....
5. திருமங்கையாழ்வார்	–	வாடினேன் வாடி வருந்தினேன்....

இஸ்லாமியம்
சீறாப்புராணம்– பாடல் நின்ற பிணை மானுக்குப்...5 பாடல்கள் (பாடல் எண்கள் 61–65).
கிருத்துவம்
இரட்சண்ய யாத்ரீகம்– கடைதிறப்புப் படலம் –5 பாடல்கள் (பாடல் எண்கள்: 3,9,10,15,16).

அலகு – 4 **(9 Hrs)**
தமிழ் இலக்கிய வரலாறு
1. சங்க இலக்கியங்கள் 2. நீதி இலக்கியங்கள் 3. பக்தி இலக்கியங்கள் 4. காப்பியங்கள்.

அலகு–5 **(9 Hrs)**
சிறுகதைகள்

1. புதுமைபித்தன்	–	அகலிகை
2. நா. பிச்சமூர்த்தி	–	வேப்பமரம்
3. அகிலன்	–	ஒரு வேளைச்சோறு
4. ஜி.நாகராஜன்	–	பச்சக் குதிரை
5. கி.ராஜநாராயணன்	–	கதவு
6. சா.கந்தசாமி	–	தக்கையின் மீது நான்கு கண்கள்
7. ஆண்டாள் பிரியதர்ஷினி	–	மாத்திரை
8. வண்ணதாசன்	–	ஒரு உல்லாசப் பயணம்
9. சு. தமிழ்ச்செல்வன்	–	வெயிலோடு போய்
10. பாரததேவி	–	மாப்பிள்ளை விருந்து

பார்வை நூல்கள் :
1. அரசு, வீ., இருபதாம் நூற்றாண்டு சிறுகதைகள் நூறு, அடையாளம் பதிப்பகம், திருச்சி, 2013.
2. அருணாச்சலம், பா., பக்தி இலக்கியங்கள், பாரி நிலையம், சென்னை, 2010.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை, 2000.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.பி.எச். பதிப்பகம், சென்னை, 2011.
5. பசுபதி, மா. வே., செம்மொழித் தமிழ் இலக்கண இலக்கியங்கள், தமிழ்ப் பல்கலைக்கழகம், 2010 .

உரைநடை நூல்கள் :
1. அன்பு, பா., மா.பொ.சி யின் ஒரு இலக்கிய நூல்கள் ஒரு மதிப்பீடு, உலக தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 1983.
2. பிள்ளை, கே.கே., தமிழக வரலாறும் மக்களும் பண்பாடும், உலக தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 2000.
3. ஜெயமோகன், நவீன இலக்கிய அறிமுகம், உயிர்மெய் பதிப்பகம், சென்னை, 1995.

இணையத்தளங்கள் :
http://www.tamilkodal.com
http://www.languagelab.com
http://www.tamilweb.com

A20GET202	GENERAL ENGLISH- II (Common to B.A., B.C.A., B.Sc.)	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To recognize poetry from a variety of cultures, languages and historic periods
- To develop the intensive study of language by critical reading
- To identify the various genres and analyze the works of writers in English
- To expand the basic understanding of targeted grammatical structures
- To understand the conventions of writing in English

Course Outcomes

After the completion of this course, the students will be able to

CO1 – Understand and appreciate poetry as a literary art form.
CO2 – Comprehend and recognize relationship between ideas, events and facts.
CO3 – Learn to explore characters and their conflicts, dilemmas and extend their response to stories.
CO4 – Apply grammatical structures meaningfully and appropriately in oral and written form.
CO5 – Write effectively and coherently.

UNIT I – POETRY **(9 Hrs)**

1. Lord Byron: She Walks in Beauty
2. Robert Frost: Stopping by Woods on a Snowy Evening
3. Nissim Ezekiel: Night of the Scorpion
4. Rabindranath Tagore: Where the Mind is Without Fear

UNIT II - PROSE **(9 Hrs)**

1. Ernest Hemingway-A Day's Wait
2. Anton Chekhov: The Lottery Ticket

UNIT III – FICTION **(9 Hrs)**

1. Jane Austen - Pride and Prejudice

UNIT IV - GRAMMAR **(9 Hrs)**

1. Voice – Conditionals - Coherence

UNIT V - COMPOSITION **(9 Hrs)**

1. Letter Writing
2. Report Writing

Text Books

1. Wisdom and Experience: An Anthology for Degree Classes. Board of Editors", Orient Longman Limited, 2007
2. "The Approach to Life: A Selection of English Prose", Orient Longman Limited, 2009
3. "Brookside Musings: A Selection of Poems and Short Stories: Board of Editors", Orient, Longman Limited, 2009.

Reference Books

1. LalithaNatarajan and SasikalaNatesan ”English for Excellence: Poetry”, Anuradha Publications Literary Pursuits: Board of Editors, Orient Longman Limited, 2015.
2. S.C. Gupta, “English Grammar & Composition”, Arihant, 2014
3. Rabindranath Tagore, Where the mind is without fear “,London : The India Society,1912.
4. Raymond Murphy and SuraiPongtongcharoen, “English Grammar in Use”, Cambridge University, 1985.

Web References

1. https://poets.org/poem/she-walks-beauty
2. https://www.poetryfoundation.org/poems/46467/the-flea
3. https://www.classicshorts.com/stories/lottery.html
4. http://short-storylovers.blogspot.com/2012/07/thief-by-ruskin-bond.html
5. http://www.gutenberg.org/files/1342/1342-h/1342-h.htm

A20CAT203	DATA STRUCTURES AND ALGORITHMS (Common to B.Sc. CS and B.C.A.)	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To introduce the primary data structures and algorithms for their associated operations.
- To understand the applications of data structures.
- To learn the implementation issues of the data structures introduced.
- To understand the concepts of searching and sorting Techniques.
- To understand the basic concepts of stack, queue, List, Trees and Graphs

Course Outcomes

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

CO1 – Analyze algorithms based on time and space complexity.
CO2 – Implement and Apply linear data structures to solve simple problems.
CO3 – Represent and Apply Non-linear data structures to solve complex problems.
CO4 – Use Divide and conquer method to solve various problems.
CO5 – Use Greedy techniques to solve real time problem.

UNIT I INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS (12 Hrs)

Types of data structures - Abstract Data Type (ADT) - Analysis of algorithm - Time and space complexity - Recurrence relation - Asymptotic notation. Sorting - Searching.

UNIT II LIST ADT (12 Hrs)

Static and dynamic Representation – Types -Single Linked List-Doubly Linked List – Circular Linked List – Operations and Applications.

UNIT III STACK AND QUEUE ADT (12 Hrs)

Static and Dynamic Representation – Operations - Applications- Balancing Parenthesis- Evaluation of Arithmetic Expression- Infix to Postfix conversion. Queue ADT: Static and dynamic Representation – Linear queue – circular queue.

UNIT IV TREE ADT AND GRAPH ADT (12 Hrs)

Representation – Types - Binary Tree - Threaded Binary Tree - Binary Search Tree - Operation and Application. Graph: Representation – Types -Graph Traversal – Depth First Search - Breadth First Search -Application - Minimum cost spanning tree - Topological Sorting.

UNIT V ALGORITHM DESIGN TECHNIQUES (12 Hrs)

Divide and Conquer - General method – Finding Minimum Maximum – Merge Sorting - Greedy Method: General Method – knapsack problem – Single source shortest path – Dijkstras: Job sequencing.

Text Books

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, 4th Edition, Pearson Education, 2013.
2. E. Horowitz, S. Sahni and S. Rajasekaran, “Computer Algorithms/C++”, Second Edition, The Orient Blackswan,2019.
3. A Puntambekar, “Data Structures”, 3rd Revised Edition, Technical Publications Pune, 2008.

Reference Books

1. ReemaThareja, “Data Structures Using C”, Edition, Oxford University Press, 2017.
2. Gilles Brassard, “Fundamentals of Algorithms”, Pearson Education, 2015.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education,Reprint, 2006.
4. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, 2rd Edition,University Press, 2008.

Web References

1. https://www.geeksforgeeks.org/
2. http://opendatastructures.org/
3. https://nptel.ac.in/courses/106/106/106106127

A20CAT204	`JAVA PROGRAMMING	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To explore the knowledge of fundamental concepts of java programming
- To Gain Knowledge about the basic java language syntax and semantics
- To know the principles of inheritances, packages, interfaces
- To get familiarized to generic programming, multithreading concepts.
- To Gain and explore the advanced concepts in Java

Course Outcomes

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

CO1 – Write a maintainable Java Program for a given algorithm and implement the same.
CO2 – Demonstrate the use of inheritance, interface and package in relevant applications.
CO3 – Create java applications using exception handling, thread and generic programming.
CO4 – Build java distributed applications using Collections and IO streams.
CO5 – Develop simple graphical user interfaces using GUI components.

UNIT I INTRODUCTION TO OBJECT ORIENTED PROGRAMMING (12 Hrs)

Introduction to classes and objects: Basic Concepts of OOPs – Platform Independence – The History and Evolution of Java - byte code – data types — variables — arrays — operators – control statements – type conversion and casting - garbage collection – String class.

UNIT II INHERITANCE, PACKAGES AND INTERFACES (12 Hrs)

Inheritance: Basic concepts and its types - access control - constructors- static keyword- final - this and super keyword — method overriding, abstract classes- Packages - Interfaces

UNIT III EXCEPTION HANDLING, MULTITHREADING (12 Hrs)

Concepts of Exception handling, types of exceptions, creating own exception - Concepts of Multithreading - creating multiple threads.

UNIT IV COLLECTIONS, I/O STREAMS (12 Hrs)

Collections: List - Vector - Stack - Queue. Input /Output Basics - Streams - Byte streams and Character streams - Reading and Writing Console - Reading and Writing Files.

UNIT V EVENT DRIVEN PROGRAMMING AND JDBC (12 Hrs)

Events - Delegation event model - Event handling - Adapter classes. AWT: Concepts of components SWING-SwingComponents. Java Database Connectivity - Programming Example.

Text Books

1. Java: The Complete Reference 11th Edition, 2018, Herbert Schildt, TMH Publishing Company Ltd, New Delhi, ISBN: 9781260440249.
2. E. Balaguruswamy, “Programming with Java” , 5th Edition, McGraw- Hill Education, 2014.

Reference Books

1. Cay S. Horstmann, Gary cornell, —Core Java Volume –I Fundamentals‖, 9th Edition, Prentice Hall, 2013.
2. Java How to Program, 6th Edition, H. M. Dietel and P.J.Dietel, Pearson Education/PHI
3. Herbert Schildt, “Java – A Beginner’s Guide”, McGraw- Hill Education, 6th Edition, 2018.

Web References

1. http://www.ibm.com/developerworks/java/
2. http://docs.oracle.com/javase/tutorial/rmi/.
3. IBM’s tutorials on Swings, AWT controls and JDBC.
4. https://www.edureka.co/blog
5. https://www.geeksforgeeks.org

A20CAD202	NUMERICAL METHODS AND STATISTICS	L	T	P	C	Hrs
		3	1	0	4	60

COURSE OBJECTIVES

- Learn the techniques of solving algebraic and transcendental equations.
- To introduce the numerical techniques of differentiation and integration.
- To know the basic concepts of statistical parameters like mean, median, mode etc.
- To understand the concept of testing of hypothesis using statistical analysis
- Identify the direction and strength of a linear correlation between two factors.

COURSE OUTCOMES

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

CO1 – Solve algebraic and transcendental equations.
CO2 – Analyze and apply the knowledge of interpolation by using the numerical methods.
CO3 – Understand the basic concepts of Statistics.
CO4 – Apply the concept of testing of hypothesis for small and large samples.
CO5 – Know the applications of linear regression and correlation.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS (12 Hrs)

Solution of algebraic and transcendental equations - Newton Raphson method - Gauss elimination method - GaussJordan method ─ Iterative methods of Gauss Jacobi and Gauss Seidel.

UNIT II NUMERICAL DIFFERENTIATION AND INTEGRATION (12 Hrs)

Interpolation: Interpolation by Newton's forward and backward difference formulae for equal intervals-Solution of Ordinary Differential Equations- Single step methods: Taylor series method - Euler methods - Integration by Trapezoidal and Simpson's rules-Lagrange's method for unequal intervals.

UNIT III MEASURES OF DISPERSION (12 Hrs)

Standard Deviation - Mean Deviation - Quartile Deviation - Range. Measures of skewness and Pearson's coefficient of Skewness - Moments about the arbitrary origin and moments based on measures of skewness and kurtosis.

UNIT IV TESTING OF HYPOTHESIS (12 Hrs)

Sampling distributions - Small and large samples -Tests based on Normal, t, Chi square, and F distributions for testing of means, variance and proportions - Contingency table (test for independent) Goodness of fit.

UNIT V CORRELATION AND REGRESSION (12 Hrs)

Curve fitting - Method of least squares - Correlation-Rank correlation- Regression -Multiple and partial correlation – Plane of regression - Coefficient of multiple correlation ─ Coefficient of partial correlation.

Text Books

1. Grewal. B.S. "Numerical Methods in Engineering and Science ", Mercury learning & Information, kindle Edition, 2018.
2. Richard A.Johnson, Irwin Miller and John E. Freund, "Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2018.
3. Bali N.P. and Dr. Manish Goyal, "Engineering Mathematics", Lakshmi Publications Pvt. Ltd., New Delhi, 9th Edition, 2015

Reference Books

1. Gupta .C.B, Shree Ram Singh, M. Kumar, “Engineering Mathematics for semester I & II”, Tata McGraw Hill, New Delhi, 2015
2. Ramesh Kumar Guptat, “Numerical Methods, Fundamental and its Applications”, Cambridge University, 2019
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, John Wiley & Sons, New Delhi,10th Edition. 2019
4. Dass .H.K & Dr. Rama Verma, “Introduction to Engineering Mathematics”, S. Chand & co, New Delhi, 2019.
5. Timothy Sauer, “Numerical Analysis”, 3rd Edition, Pearson Education, 2017.
6. Arvind Pragati Gautam, “Numerical Methods”, Alpha Science International Limited 2019.

Web References

1. http://nptel.ac.in/courses/111107063/
2. https://nptel.ac.in/courses/111107119/
3. https://nptel.ac.in/courses/110/105/110105087/
4. https://nptel.ac.in/courses/111/105/111105077/
5. https://www.coursera.org/learn/basic-statistics

A20AET202	PUBLIC ADMINISTRATION	L	T	P	C	Hrs
		2	0	0	2	30

**(Compulsory Course designed as per the directions issued by Government of India, MHRD, Department of Higher Education (Central University Bureau)
F.No.19-6.2014-Desk U Dated 19-05-2014)**

Course Objectives

- To introduce the elements of public administration
- To help the students obtain a suitable conceptual perspective of public administration
- To introduce them the growth of institution devices to meet the need of changing times
- To instill and emphasize the need of ethical seriousness in contemporary Indian Public Administration

Course Outcomes

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

CO1 – Understand the concepts and evolution of Public Administration.
CO2 – Be aware of what is happening in the Public Administration in the country
CO3 – Explain the Territory Administration in the State and the Centre
CO4 – Appreciate emerging issues in Indian Public Administration

UNIT I INTRODUCTION TO PUBLIC ADMINISTRATION (7 Hrs)

Meaning, nature and Scope of Public Administration and its relationship with other disciplines- Evolution of Public Administration as a discipline — Woodrow Wilson, Henry Fayol, Max Weber and others - Evolution of Public Administration in India — Arthashastra — Colonial Administration upto 1947

UNIT II PUBLIC ADMINISTRATION IN INDIA (8 Hrs)

Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat -— All India Services – Training of Civil Servants – UPSC – NitiAyog – Statutory Bodies: The Central Vigilance Commission – CBI - NationalHuman Rights Commission – National Women's Commission –CAG

UNIT III STATE AND UNION TERRITORY ADMINISTRATION (8 Hrs)

Differential Administrative systems in Union Territories compared to States Organization of Secretariat: -Position of Chief Secretary, Functions and Structure of Departments, Directorates – Ministry of Home Affairs supervision of Union Territory Administration – Position of Lt.Governor in UT – Government of Union Territories Act 1963 – Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island

UNIT IV EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION (7 Hrs)

Changing Role of District Collector – Civil Servants – Politicians relationship – Citizens Charter - Public Grievance Redressal mechanisms —- The RTI Act 2005 – Social Auditing and Decentralization – Public Private Partnership.

Text Books

1. Avasthi and Maheswari, "Public Administration", Lakshmi Narain Agarwal, 1st Edition, 2016.
2. Ramesh K.Arora, "Indian Public Administration: Institutions and Issues", New Age International Publishers, 3rd Edition, 2012.
3. RumkiBasu, "Public Administration: Concept and Theories", Sterling, 1st Edition, 2013.

Reference Books

1. Siuli Sarkar, “Public Administration in India”, Prentice Hall of India, 2nd Edition, 2018.
2. M. Laxmikanth, “Public Administration”, McGraw Hill Education, 1st Edition, 2011.
3. R.B.Jain, “Public Administration in India, 21st Century Challenges for Good Governance”, Deep and DeepPublications, 2002.

Web References

1. http://cic.gov.in/
2. http://www.mha.nic.in/
3. http://rti.gov.in/
4. http://www.cvc.nic.in/

A20CAL203	DATA STRUCTURES LAB (Common to B.Sc. CS and B.C.A)	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To learn the basic concepts of Data Structures.
- To learn about the concepts of Searching and Sorting.
- To design and implement various Data Structures algorithms.
- To study about the linear and non-linear Data Structures.
- To learn about the concepts of ADT including List, stack and Queues.

Course Outcomes

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

CO1 – Analyze the algorithm's / program's efficiency in terms of time and space complexity.
CO2 – Solve the given problem by identifying the appropriate Data Structure.
CO3 – Solve problems in linear and non-linear Data Structures.
CO4 – Develop programs using various searching methods.
CO5 – Solve the problems using Linked List

List of Exercises

1. Write a C program to implement recursive and non-recursive i) Linear search ii) Binary Search.
2. Write a C program to implement i) Bubble sort ii) Selection sort iii) Insertion sort iv) Shell sort v) Heap sort.
3. Write a C program to implement the following using an array. a) Stack ADT b) Queue ADT
4. Write a C program to implement list ADT to perform following operations.
   a) Insert an element into a list.
   b) Delete an element from list
   c) Search for a key element in list
   d) Count number of nodes in list.
5. Write a C program to implement the following using a singly linked list. a) Stack ADT b) Queue ADT.
6. Write a C program to implement ADT using a doubly linked list and an array.
7. Write a C program to perform the following operations:
   a) Insert an element into a binary search tree.
   b) Delete an element from a binary search tree.
   c) Search for a key element in a binary search tree.
8. Write a C program that use recursive functions to traverse the given binary tree in
   a) Preorder b) Inorder and c) Postorder.
9. Write a C program to perform the AVL tree operations.
10. Write a C program to implement Graph Traversal Techniques.

Reference Books

1. Ellis Horowitz, SartajSahni, "Fundamentals of Data Structures", Illustrated Edition, Computer Science Press, 2018.
2. Rohit Khurana, "Data structures using C", 1st Edition, Vikas Publishing, 2014.
3. S.K.Srivastava, Deepali Srivastava, "Data Structures Through C in Depth" ,BPB Publications in the year 2011.

Web References

1. https://www.tutorialspoint.com/data_structures_algorithms/
2. https://www.w3schools.in/data-structures-tutorial/intro/
3. https://nptel.ac.in/courses/106103069/
4. https://swayam.gov.in/nd1_noc20_cs70/preview
5. Data Structures Laboratory Manual, Department of Computer Science and Engineering, Sri Manakula Vinayagar Engineering College.

A20CAL204	`JAVA PROGRAMMING LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To acquire programming skill in core java.
- To learn how to design java program and applications.
- To acquire object oriented skills in java.
- To develop the skill of designing applications.
- To know the use of java in a variety of technologies and on different platforms

Course Outcomes

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

CO1 – Apply and practice logical formulations to solve simple problems leading to specific applications.
CO2 – Demonstrate the use of inheritance, interface and package in relevant applications.
CO3 – Create java applications using exception handling, multithread.
CO4 – Build java distributed applications using Collections and IO streams
CO5 – Develop simple graphical user interfaces using GUI components.

List of Exercises

1. Develop simple programs using java syntax and semantics.
2. Develop a java program that implements the interface.
3. Develop a java program that implements the Packages.
4. Write a java program to demonstrate inheritance.
5. Develop a program to illustrate the use of Multi Threads.
6. Create java applications using Exception Handling.
7. Write programs in Java to demonstrate the use of following components Text fields, buttons, Scrollbar, Choice, List and Check box
8. Write Java programs to demonstrate the use of various Layouts like Flow Layout, Border Layout, Grid layout, Gridbag layout and card layout
9. Design an application using event-driven programming and JDBC to connect a back-end database using Java.

Text Books

1. Herbert Schildt , “Java: The Complete Reference “, TMH Publishing Company Ltd, New Delhi,ISBN: 9781260440249, 11th Edition, 2018
2. Cay S. Horstmann, Gary Cornell, “Core Java Volume –I Fundamentals ll”, 9th Edition, Prentice Hall, 2013.
3. H. M. Dietel and P. J. Dietel ,”Java How to Program”, 6th Edition, , Pearson Education/PHI
4. Cay. S. Horstmann and Gary Cornell ,“Core Java 2”, Volume 2, Advanced Features, 7th Edition, Pearson Education.

Web References

1. http://www.ibm.com/developerworks/java/
2. http://docs.oracle.com/javase/tutorial/rmi/.
3. IBM’s tutorials on Swings, AWT controls and JDBC.
4. https://www.edureka.co/blog
5. https://www.geeksforgeeks.org

A20EAL201	NATIONAL SERVICE SCHEME (Common to all B.A., B.Sc., B.Com., B.B.A., B.C.A.)	L	T	P	C	Hrs
		0	0	2	1	30

Course Objectives

- To introduce about various activities carried out by national service scheme.
- To gain life skills through community service.
- To gain awareness about various service activities performed in higher educational institutions.
- To give exposure about the use of technology to uplift the living standards of rural community.
- To induce the feeling of oneness through harmony of self and society.

Course Outcomes

After the end of the course, the students will able to

CO1 – Recognize the importance of national service in community development.
CO2 – Convert existing skills into socially relevant life skills.
CO3 – Differentiate various schemes provided by the government for the social development
CO4 – Identify the relevant technology to solve the problems of rural community.
CO5 – Associate the importance harmony of nation with long term development

UNIT I INTRODUCTION TO NATIONAL SERVICE SCHEME (6 Hrs)

History and objectives, NSS symbol, Regular activities, Special camping activities, Village adaptation programme, Days of National and International Importance, Hierarchy of NSS unit in college. Social survey method and Data Analysis. NSS awards and recognition. Importance of Awareness about Environment, Health, Safety, Gender issues, Government schemes for social development and inclusion policy etc.,

UNIT II LIFE SKILLS AND SERVICE LEARNING OF VOLUNTEER (6 Hrs)

Communication and rapport building, problem solving, critical thinking, effective communication skills, decision making, creative thinking, interpersonal relationship skills, self- awareness building skills, empathy, coping with stress and coping with emotions. Understanding the concept and application of core skills in social work practice, Team work, Leadership, Event organizing, resource planning and management, time management, gender equality, understanding rural community and channelizing the power of youth.

UNIT III EXTENSION ACTIVITIES FOR HIGHER EDUCATIONAL INSTITUTIONS (6 Hrs)

Objective and functions of Red Ribbon Club, Swatchh Bharath Abhiyan, Unnat Bharat Abhiyan, Jal Shakthi Abhiyan, Road Safety Club, Environmental club and Electoral literacy club.

UNIT IV USE OF TECHNOLOGY IN SOLVING ISSUES OF RURAL INDIA (6 Hrs)

Understanding community issues, economic development through technological development. Selection of appropriate technology, Understanding issues in agriculture, fishing, artisans, domestic animals, health and environment.

UNIT V NATIONAL INTEGRATION AND COMMUNAL HARMONY (6 Hrs)

The role of Youth organizations in national integration, NGOs, Diversity of Indian Nation, Importance of National integration communal harmony for the development of nation, Indian Constitution, Building Ethical human Relationships, Universal Human Values, Harmony of self and Harmony of nation.

Reference Books

1. Joseph, Siby K and Mahodaya Bharat (Ed.), " Essays on Conflict Resolution", Institute of GandhianStudies, Wardha,2007.
2. Barman Prateeti and Goswami Triveni (Ed.), " Document on Peace Education", Akansha PublishingHouse, New Delhi, 2009
3. Sharma Anand and G. Davi," Gandhian Way, Academic Foundation", New Delhi Myers SocialPsychology. New Delhi: Tata Mc.Graw Hill, 2007.
4. Taylor E. Shelly et.al , "Social Psychology ",12th Edition New Delhi, Pearson Prentice Hall Singh, 2006.
5. Madhu, "Understanding Life Skills, background paper prepared for education for all: The leap to equality, Government of India report", New Delhi, 2003.
6. Sandhan " Life Skills Education, Training Module, Society for education and development",2005.
7. Jaipur. Radakrishnan Nair and Sunitha Rajan , "Life Skill Education: Evidences form the field", RGNIYD publication,Sriperumbudur,2012.
8. National Service Scheme Manual (Revised) , Government of India, Ministry of Youth Affairs and Sports, New Delhi.
9. M. B. Dishad, "National Service Scheme in India: A Case study of Karnataka , Trust Publications, 2001.

Web References

1. http://www.thebetterindia.com/140/national-service-scheme-nss/
2. http://en.wikipedia.org/wiki/national-service-scheme 19=http://nss.nic.in/adminstruct
3. http://nss.nic.in/propexpan
4. http://nss.nic. in
5. http://socialworknss.org/about.html

A20CAT305	OPERATING SYSTEMS	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To grasp a fundamental understanding of operating systems and processes
- To learn the concepts of CPU scheduling and deadlock
- To understand synchronization and memory management concepts in OS
- Understand the concepts of file systems and secondary storage structure
- To learn the features of commercial operating systems

Course Outcomes

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

CO1 – Define the concepts of operating systems operations, processes and threads.
CO2 – Apply the concepts of CPU scheduling and deadlock techniques.
CO3 – Simulate the principles of memory management.
CO4 – Identify appropriate file system and disk organizations for a variety of computing scenario.
CO5 – Examine the features of various open source operating systems.

UNIT I INTRODUCTION AND PROCESS MANAGEMENT (12Hrs)

Operating system structure – Operating system operations – Process management – Memory management – Storage management – Protection and Security – System structures: Operating system services – System calls – Types of system calls – System programs. Process scheduling – Operations on processes – Inter-process communication.

UNIT II CPU SCHEDULING AND DEADLOCK (12Hrs)

Overview of threads – Multithreading models – Threading issues – Basic concepts of process scheduling – Scheduling criteria – Scheduling algorithms – Multiple processor scheduling, Dead Lock: Characterization – Prevention Detection – Avoidance and Recovery.

UNIT III CONCURRENT PROCESSES AND MEMORY MANAGEMENT (12Hrs)

Process synchronization: The Critical Section Problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors. Memory Management: Swapping – Contiguous memory allocation – Paging – Structure of the Page Table – Segmentation, Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

UNIT IV FILE SYSTEMS AND SECONDARY STORAGE STRUCTURE (12Hrs)

File Concept - Access Methods - Directory structure - File system mounting - File sharing - Protection - File system structure - File system implementation - Directory Implementation - Allocation methods - Free-space management. Disk structure - Disk Scheduling - Disk Management - Swap-Space management.

UNIT V I/O BASED LINUX (12Hrs)

LINUX System: Basic Concepts – System administration – Requirements for Linux System Administrator – Setting up a LINUX multifunction server – Domain Name System – Setting up local network services.

Text Books

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, John Wiley & Sons Ninth Edition, 2017.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India, 3rd Edition, 2015.
3. Gary Nutt, “Operating Systems - A Modern Perspective”, Pearson Education, Second Edition, 2013.

Reference Books

1. William Stallings, “Operating System”, Prentice Hall of India, 6th Edition, 2015.
2. Thomas Anderson and Michael Dahlin, “Operating Systems principles and practice”, Wiley, 2nd Edition, 2014.
3. Harvey M. Deitel, “Operating Systems”, Pearson Education, Third Edition, 2013.
4. Silberschatz, Galvin, “Operating System Concepts”, Wiley, Student Edition, 2006.
5. William Stallings, “Operating System: Internals and design Principles”, New Edition (7), Pearson Education India.

Web References

1. https://nptel.ac.in/courses/106108101/
2. http://www.tcyonline.com/tests/operating-system-concepts
3. http://www.galvin.info/history-of-operating-system-concepts-textbook
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/index.html
5. https://www.cse.iitk.ac.in/pages/CS330.html

A20CAT306	PYTHON PROGRAMMING	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives
- To acquire programming skill in core python.
- To learn the basic Syntax and Semantics of Python Programming.
- To learn how to design python program and applications.
- To acquire object oriented skills in python.
- To develop the skill of designing applications using modules and packages

Course Outcomes
After completion of the course, the students will be able to
CO1 – Define the structure and components of a python program.
CO2 – Illustrate the concepts of Python decision statements.
CO3 – Interpret the use of loops and functions to facilitate code reuse.
CO4 – Use list, tuple, Set and dictionary in python program.
CO5 – Read / write data from/to files and structure a program using Exceptions and Modules.

UNIT I INTRODUCTION TO PYTHON PROGRAMMING LANGUAGE (12Hrs)
Introduction to Python Language – Strengths and Weaknesses – IDLE – Visual Source Code – Arithmetic Operators – Arithmetic Expressions – Dynamic Types – Naming Conventions – String Values – String Operations – String Slices – String Operators – Numeric Data Types – Conversions

UNIT II DECISION MAKING (12Hrs)
Control Flow: Introduction – Control Flow and Syntax – Indenting –Relational Operators – Relational Expressions – Logical – Operators – Logical Expressions – If Statement – If else – Elif – Nested if.

UNIT III LOOPING (12Hrs)
Loop: The while Loop –Break and continue – Nested while Loop – For Loop – Nested for Loop. Functions: parameters – Return values – Local and global scope – Function composition – Recursion and lambda functions.

UNIT IV LIST, TUPLE, SET, DICTIONARY AND ARRAYS (12Hrs)
Lists: List operations – List slices – List methods – List loop – Mutability – Aliasing – Cloning lists – List parameters – Tuples: Tuple assignment – Tuple as return value – Advanced list processing – List comprehension – Sets – Dictionaries: Operations and methods – Arrays.

UNIT V FILES, EXCEPTIONS, MODULES AND PACKAGES (12Hrs)
Built In Functions. Files and Exception: Text Files – Reading and writing files – Format operator – Command line arguments – Errors and exceptions – Handling exceptions – Modules – Standard modules – Packages.

Text Books
1. Martin C Brown, “Python The Complete Reference”, McGraw-Hill Education, 4th Edition,2018
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist‘‘, Shroff/O‘Reilly Publishers, 2nd edition, 2016(http://greenteapress.com/wp/thinkpython/).
3. ReemaThareja, “Python Programming Using Problem Solving Approach”, ISBN:9780199480173, Oxford University Press, First edition, 2017.

Reference Books
1. Robert Sedgewick, “Kevin Wayne, Robert Dondero – Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt. 2016.
2. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,2015.
3. Ben Stephenson, “The Python Workbook A Brief Introduction with Exercises and Solutions”, Springer International Publishing, Switzerland2014.

Web References

1. https://www.learnpython.org/
2. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
3. https://www.codecademy.com/learn/learn-python
4. https://nptel.ac.in/courses/106/106/106106182/

A20CAD303	OPERATION RESEARCH	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To learn about the Linear programming problem.
- To know the types of solution of LPP.
- To understand Transportation and Assignment Problem.
- To learn the Project Scheduling Techniques.
- To study the behavior of the functions of inventory and its disadvantages.

Course Outcomes

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

CO1 – Frame the Linear programming problem
CO2 – Solve the Linear Programming problem
CO3 – Know the solution of Transportation and Assignment problem.
CO4 – Understand the Applications of PERT- CPM.
CO5 – Understand the types of Inventory control.

UNIT I INTRODUCTION TO OR (12Hrs)

Origin of OR and its definition. Concept of optimizing performance measure, Types of OR problems, Deterministic vs. Stochastic optimization, Phases of OR problem approach – problem formulation, building mathematical model, deriving solutions, validating model, controlling and implementing solution.

Linear programming – Examples from industrial cases, formulation & definitions, Matrix form. Implicit assumptions of LPP. Convex set, Convex polyhedron, Extreme points, Basic feasible solutions.
Some basic concepts and results of linear algebra – Vectors, Matrices, Linear Independence / Dependence of vectors, Rank, Basis, System of linear eqns., Hyperplane.

UNIT II LINEAR PROGRAMMING (12Hrs)

Geometric method: 2-variable case, Special cases – infeasibility, unboundedness, redundancy & degeneracy, Sensitivity analysis. Simplex Algorithm – slack, surplus & artificial variables, computational details, big-M method, identification and resolution of special cases through simplex iterations. Duality – formulation, results, fundamental theorem of duality, dual-simplex and primal-dual algorithms

UNIT III TRANSPORTATION AND ASSIGNMENT PROBLEMS (12Hrs)

TP - Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations, Solution methods – NWCR, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution. AP - Examples, Definitions – decision variables, constraints, formulation, Balanced & unbalanced situations, Solution method – Hungarian, test for optimality (MODI method), degeneracy & its resolution.

UNIT IV PERT – CPM (12Hrs)

Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing/time-cost trade-off.

UNIT V INVENTORY CONTROL (12Hrs)

Functions of inventory and its disadvantages, ABC analysis, Concept of inventory costs, Basics of inventory policy (order, lead time, types), Fixed order-quantity models – EOQ, POQ & Quantity discount models. EOQ models for discrete units, sensitivity analysis and Robustness, Special cases of EOQ models for safety stock with known / unknown stock out situations, models under prescribed policy, Probabilistic situations

Text Books

1. H.A. Taha., Operations Research: An Introduction. Pearson,10th edition
2. F.S. Hiller and G.J. Lieberman, Introduction to Operations Research. Third edition 2015.
3. K.G. Murthy, Linear Programming.Wiley, Third edition 2019.

Reference Books

1. G. Hadley, .Linear Programming.
2. H.M. Wagner, Principles of OR with Application to Managerial Decisions..
3. Saaty ,Elements of Queuing Theory. Thomas.
4. A.RaviRavindran, Operations Research and Management Science, Hand Book: Management Guide to PERT/CPM. Wiest&Levy.J.W.Prichard and R.H Modern Inventory Management.

Web References

1. https://www.ifors.org/what-is-
2. https://www.springer.com/journal/12351
3. https://www.britannica.com/topic/operations-research

A20CAL305	OPERATING SYSTEMS LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To learn basic UNIX / LINUX commands
- To develop programs in Linux environment using system calls.
- To implement the CPU scheduling algorithms.
- To implement Deadlock handling algorithm.
- To develop solutions for synchronization problems using semaphores

Course Outcomes

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

CO1 – Understand the basic commands for UNIX / Linux.
CO2 – Develop simple shell programs**.**
CO3 – Implement different Scheduling Algorithms.
CO4 – Apply the basic concepts of Deadlock Handling procedures.
CO5 – Simulate Critical Section problem using Semaphore.

List of Exercises

1. Study of basic UNIX / Linux commands
2. Shell Programming - I
    (a) To Write a Shell program to count the number of words in a file.
    (b) To Write a Shell program to calculate the factorial of a given number.
    (c) To write a Shell program to generate Fibonacci series.
    (d) Write a Shell Program to wish the user based on the login time.
3. Shell Programming - II
    (a) Loops
    (b) Patterns
    (c) Expansions
    (d) Substitutions
4. Programs using the following system calls of UNIX/Linux operating system: fork, exec, getpid, exit, wait, close, stat, open dir, read dir.
5. To write a program to simulate cat command.
6. To write a program to simulate head and tail commands.
7. Simulate UNIX commands like ls, grep.
8. Process Scheduling- FCFS, SJF, Priority and Round robin.
9. Implementation of Banker's algorithm.
10. Producer and Consumer problem using semaphores.

Reference Books

1. William Stallings, "Operating System", Pearson Education, Sixth edition, 2015.
2. Andrew S. Tanenbaum, Modern Operating Systems,3rd edition Prentice Hall of India Pvt. Ltd, 2015.
3. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt, Third Edition, 2013
4. William Stallings, "Operating System: Internals and design Principles", Old Edition(7), Pearson Education,2013.
5. Silberschatz, Galvin, "Operating System Concepts", Wiley, Student Edition,2006.

Web References

1. https://www.geeksforgeeks.org
2. http://avanthioslab.blogspot.com/2016/08/file-organization-techniques.html
3. https://www.programming9.com/programs/c-programs/285-page-replacement-programs-in-c

A20CAL306	PYTHON PROGRAMMING LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To acquire programming skill in core python.
- To learn how to design python program and applications.
- To acquire object oriented skills in python.
- To design and implement modules and packages.
- To develop the skill of designing applications.

Course Outcomes

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

CO1 – Examine Python syntax and semantics.
CO2 – Demonstrate proficiency in handling Strings using Python.
CO3 – Compile, run and manipulate Python Programs using List, Tuple, Set, Dictionary.
CO4 – Interpret the concepts of Functions in Python.
CO5 – Implement exemplary applications related to modules and packages in Python.

List of Exercises

1. Demonstrate python program using Arithmetic expressions and Relational Expressions.
2. Demonstrate python program using Strings.
3. Demonstrate python program for the decision making statements.
4. Write Python Functions to facilitate code reuse.
5. Basic python applications using List, Tuples and Sets.
6. Implementation of Searching and Sorting.
7. Implement python programs using Dictionaries
8. Illustrate file concepts with real time problems
9. Use Exception handling in python applications for error handling.
10. Implement simple applications using Modules and Packages.

Reference Books

1. Reema Thareja, “Python Programming Using Problem Solving Approach”, Oxford University Press; First edition,2017.
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt.,2016.
3. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,2015.
4. Ben Stephenson, “The Python Workbook A Brief Introduction with Exercises and Solutions”, Springer International Publishing, 2014.
5. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Pragmatic Programmers, LLC, Second edition, 2013.

Web References

1. https://nptel.ac.in/courses/106/106/106106182/
2. https://www.learnpython.org/
3. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
4. https://www.codecademy.com/learn/learn-python

A20CAT407	DATABASE MANAGEMENT SYSTEMS	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To learn about Database Structure and Data Models.
- To study SQL Commands for storing and retrieving data into the database.
- To study the Relational database system design
- To understand the concept of Transactions
- To understand the concept of Concurrency Control and Recovery System

Course Outcomes

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

CO1 - Design conceptual data model using Entity Relationship Diagram.

CO2 - Design conceptual and logical database models for an application.

CO3 - Normalize relational database design of an application.

CO4 - Explain the need for Indexing, Hashing and Transactions in database**.**

CO5 - Understand the strategies for providing security, privacy, and recovery of data.

UNIT I INTRODUCTION (12Hrs)

Database System Application – Purpose of Database Systems – View of Data – Database Languages – Relational Database – Database Design – System Structure – Database Architecture. Database Design and E-R Model: Overview of the Design Process – The E-R Model – Constraints – E-R Diagrams- E-R Design Issues – Extended E-R features – Reduction to Relational Schemas – Other aspects of Database Design.

UNIT II RELATIONAL MODEL (12Hrs)

Structure of Relational Database – Fundamental Relational Algebra Operations – Extended Relational Algebra Operations – Modification of the Database. Structured Query Language: Introduction – Basic Structure of SQL Queries – Set Operations – Additional Basic Operations – Aggregate Functions – Null Values – Nested Sub queries – Views – Join Expression.

UNIT III RELATIONAL DATABASE DESIGN (12Hrs)

Features of Good Relational Designs – 1NF – 2NF – 3NF and 4NF with Examples. Atomic Domains and first Normal form – Decomposition using Functional Dependencies – Functional Dependency Theory – Algorithm for Decomposition – Decomposition using Multivalued Dependencies.

UNIT IV INDEXING - HASHING AND TRANSACTION MANAGEMENT (12Hrs)

Basic Concepts – Ordered Indices – B+ Tree Index Files – B-Tree Files – Multiples – Key Access – Static Hashing – Dynamic Hashing – Comparison of Ordered Indexing and Hashing – Bitmap Indices.

UNIT V TRANSACTION MANAGEMENT (12Hrs)

Transaction Management: Transaction concept – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation and Atomicity – Serializability – Recoverability – Transaction Isolation Levels – Implementation of Isolation Levels.

Text Books

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, “Database System Concepts”, McGraw-Hill, 7th Edition, 2019.
2. RamezElmasri and ShamkantNavathe, Durvasula V L N Somayajulu, Shyam K Gupta, “Fundamentals of Database Systems”, Pearson Education, 2018.
3. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, “Database Systems The Complete Book” Prentice Hall, 2nd Edition, 2014.

Reference Books

1. Raghu Ramakrishna, Johannes Gehrke, “Database Management Systems”, McGraw Hill, 3rdEdition,2014.
2. G.K.Gupta,"Database Management Systems”, Tata McGraw Hill, 2011.
3. Date CJ, Kannan A, Swamynathan S, “An Introduction to Database System”, Pearson Education, 8thEdition,2006.
4. Paul Beynon-Davies, “Database Systems”, Palgrave Macmillan, 3rdEdition, 2003.
5. Mukesh Chandra Negi, “Fundamentals of Database Management Systems”, BPB Publications, 2019.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. http://dev.mysql.com/doc/
3. http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf
4. https://nptel.ac.in/courses/106/106/106106095/
5. https://www.tutorialspoint.com/dbms/index.htm

A20CAT408	COMPUTER NETWORKS	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the basic concepts of Data Communications.
- To understand the functionalities and components involved in the physical layer.
- To learn the basic concepts of data link layer services and network layer communication protocols
- To understand various load characteristics and network traffic conditions, decide the transport protocols to be used.
- To analyze and compare the different protocols available in the application layer.

Course Outcomes

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

CO1 - Analyze the network components and network standards.
CO2 - Determine the Physical layer functionalities, Transmission modes and media**.**
CO3 - Analyze the Error correction and detection techniques and determine the proper usage of IP address, subnet mask and default gateway in a routed network.
CO4 - Describe, analyze and compare different protocols in transport layer**.**
CO5 - Analyze the functional working of different protocols of application layer**.**

UNIT I DATA COMMUNICATIONS (12Hrs)

Overview of Data Communications – Networks and its types – Network topologies. Transmission technologies: Signal Transmission – Digital signaling – Analog Signaling. Networks Models: Protocol Layering – OSI reference model – TCP/IP Protocol suite.

UNIT II PHYSICAL LAYER (12Hrs)

Physical layer functionalities – Analog to digital conversion using PCM, Transmission Modes: Parellel–Serial.Transmission Media: Guided and unguided media.Switching: Introduction. Circuit Switching and Packet switching Networks.

UNIT III DATA LINK LAYER AND NETWORK LAYER (12Hrs)

Data link layer services – Error Detection and Correction – Sliding window protocols – Network devices. Network layer functionality. Routing Algorithms: Shortest path algorithm, Distance vector routing – Subnetting – Network layer protocols: IPV4, IPV6.

UNIT IV TRANSPORT LAYER (12Hrs)

The Transport Services - Connection management – Transport layer Congestion Control – Transport Layer Protocols: User Datagram Protocol (UDP) – Transmission Control Protocol (TCP).

UNIT V APPLICATION LAYER (12Hrs)

Application Layer Protocols – HTTP – FTP – Telnet – Email (SMTP, POP3, IMAP, MIME) – DNS – Need for Cryptography and Network Security – Firewalls.

Text Books

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. Tanenbaum,A.S. and David J. Wetherall “Computer Networks”, 5th ed., Prentice Hall, 2011
3. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach: International Edition”, Pearson Education, Sixth edition, 2013.

Reference Books

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks- A system approach”, 5th edition, Elsevier, 2012.
2. Stallings, W., “Data and Computer Communications”, 10th Ed., Prentice Hall Int. Ed., 2013.
3. DayanandAmbawade, Deven Shah, "Advanced Compter Networks", Dreamtech Press, 1st edition, 2011.
4. PallapamanviV , "Data Communications and Computer Networks", PHI, 4th edition, 2014.
5. Andre S.Tanenbaum, "Computer Networks", Pearson Publication, 4th Edition, 2018.

Web References

1. https://www.geeksforgeeks.org/last-minute-notes-computer-network/
2. https://lecturenotes.in
3. https://www.cse.iitk.ac.in/users/dheeraj/cs425/
4. https://nptel.ac.in/courses/106/105/106105183/
5. https://nptel.ac.in/courses/106/105/106105081/

A20CAT409	SOFTWARE ENGINEERING	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To familiarize the concepts of Software Engineering.
- To understand Software Design concepts.
- To learn about Software testing.
- To understand the Software testing techniques.
- To understand the levels of testing.

Course Outcomes

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

CO1 – Perform Software engineering processes
CO2 – Make use of software design
CO3 – Apply different software testing strategies
CO4 – Illustrate different testing techniques.
CO5 – Make use of different levels of testing in their software.

UNIT I PRODUCT, PROCESS AND PROJECT (12 Hrs)

The Product-The Process-Project Management Concepts-Software Projects And Project Metrics

UNIT II SOFTWARE PROJECT PLANNING (12 Hrs)

Software Project Planning - Risk Analysis And Management - Project Scheduling And Tracking - Software Quality Assurance

UNIT III SOFTWARE CONFIGURATION MANAGEMENT (12 Hrs)

Software Configuration Management-System Engineering-Analysis Concepts And Principles-Analysis Modeling.

UNIT IV SOFTWARE DESIGN (12 Hrs)

Design Concepts and Principles-Architectural Design-User Interface Design.

UNIT V SOFTWARE TESTING (12 Hrs)

Component level Design-Software Testing Techniques-Software Testing Strategies-Technical Metrics For Software

Text Books

R. S. Pressman, 2005, Software Engineering A Practitioner's approach, 6th Edition, Tata McGraw-Hill, New Delhi.

Reference Books

1. I. Sommerville, 2001, Software Engineering, 6th Edition, Addison Wesley, Boston.
2. Rajib Mal, 2005, -Fundamental of Software engineering , 2 nd Edition , PHI, New Delhi.
3. N. E. Fenton, S. L. Pfleenger, 2004, Software Metrics, Thomson Asia, Singapore.
4. S. L. Pfleeger and J.M. Atlee, "Software Engineering Theory and Practice", Pearson Education, Third edition, 2008.
5. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd., 2010.

Web References

1. https://nptel.ac.in/courses/106/105/106105150/
2. https://www.youtube.com/watch?v=5FUdrBq-WFo
3. https://www.youtube.com/watch?v=T3q6QcCQZQg

A20CAL407	DBMS LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To learn and understand DDL & DML.
- To learn and understand DCL.
- To implement Basic SQL commands.
- To execute PL/SQL programs.
- To develop GUI applications in any platform.

Course Outcomes

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

CO1 – Implement DDL and DML commands.
CO2 – Implement DCL commands.
CO3 – Analyze PL/SQL programs.
CO4 – Understand PL/SQL programs.
CO5 – Develop GUI applications in their known platform.

List of Exercises

1. Create Table using Data Definition Language (DDL).
2. Modify Table using Data Manipulation Language (DML).
3. Store and Retrieve data through Data Control Language (DCL).
4. Implement Constraints and Built-in functions in various tables.
5. Perform Joins and Group-by functions.
6. Implement Simple Programs in PL/SQL.
7. Create PL/SQL programs using functions.
8. Create PL/SQL programs using procedures.
9. Create PL/SQL programs using triggers.
10. Developing GUI applications.
    - Student Information System.
    - Inventory Management.
    - Payroll Processing.

Reference Books

1. Ramez Elmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, Pearson Education, 7th Edition, 2016.
2. Raghu Ramakrishna, Johannes Gehrke, Database Management Systems, McGraw Hill,3rd Edition, 2014.
3. Abraham Silberschatz, Henry F Korth, S Sudharshan, Database System Concepts", McGraw-Hill Indian Edition, 7th Edition, 2013.
4. Kuhn,"RMAN Recipes for Oracle Database", Apress, 2nd Edition,2013.
5. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System, Pearson Education, 8th Edition, 2006.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. http://dev.mysql.com/doc/
3. http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf

A20CAL408	COMPUTER NETWORKS LAB	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To gain and explore the basic concepts of Data Communications.
- To understand the signals and transmission media involved in the physical layer.
- To learn the basic concepts of data link layer services and network layer communication protocols
- To synthesize various load characteristics and network traffic conditions, decide the transport protocols to be used.
- To analyze and compare the different protocols available in the application layer and Network Security.

Course Outcomes

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

CO1 – Analyze the network components and network standards.
CO2 – Determine the Physical layer functionalities, Transmission media and Switching**.**
CO3 – Analyze the Error correction and detection techniques and determine the proper usage of IP address, subnet mask and default gateway in a routed network.
CO4 – Describe, analyze and compare different protocols in transport layer**.**
CO5 – Analyze the functional working of different protocols of application layer and Network Security**.**

List of Exercises

Implement the following exercises using JAVA:

1. Implementation of a socket program for Echo/Ping/Talk commands.
2. Creation of a socket between two computers and enable file transfer between them. using (a)TCP (b) UDP
3. Implementation of a program for Remote Command Execution (Two M/Cs may be used).
4. Implementation of a program for CRC and Hamming code for error handling.
5. Writing a code for simulating Sliding Window Protocols.
6. Create a socket for HTTP for web page upload & Download.
7. Write a program for TCP module Implementation.(TCP services).
8. Write a program to implement RCP (Remote Capture Screen).

Implement the following exercises using CISCO Simulator:

9. Implementation and Performance evaluation of the following routing protocols:
    a. Shortest path routing
    b. Flooding
    c. Link State
    d. Hierarchical
10. Broadcast /Multicast routing.
11. Implementation of ARP.
12. Throughput comparison between 802.3 and 802.11.
13. Study of Key distribution and Certification schemes.
14. Design of an E-Mail system.
15. Implementation of Security Compromise on a Node.
16. Implementation of Various Traffic Sources.

Reference Books

1. AndrewS.Tanenbaum,"Computer Networks",Pearson Publication,4th Edition,2018.
2. Pallapamanvi. V ,"Data Communications and Computer Networks", PHI, 4th edition, 2014.
3. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach: International Edition”, Pearson Education, Sixth edition, 2013.
4. Stallings, W., “Data and Computer Communications”, 10th Ed., Prentice Hall Int. Ed., 2013.
5. DayanandAmbawade, Deven Shah,"Advanced Computer Networks", Dreamtech Press, 1st edition.

Web References

1. https://nptel.ac.in/courses/106/105/106105183/
2. https://nptel.ac.in/courses/106/105/106105081/
3. https://www.geeksforgeeks.org/last-minute-notes-computer-network/
4. https://lecturenotes.in
5. https://www.cse.iitk.ac.in/users/dheeraj/cs425/