Dayananda Sagar University

School of Engineering

Kudlu Gate, Hosur Road, Bengaluru 560068

DEPARTMENT OF COMPUTER APPLICATIONS

HANDBOOK FOR BCA PROGRAM

Vision

To emerge as a power house of Information Technology and Allied areas developing competent computer professionals to meet the dynamic needs of disruptive technologies.

Mission

- To impart technical knowledge through innovative teaching, research and consultancy.
- Provides state-of-the-art facilities and internationally recognized faculty.
- To adapt to the dynamic needs of industries through curriculum update.
- Promotes partnerships with industry and community.
- To produce competent graduates with professional ethics and life skills.

PEO'S PO'S & PSO'S

Program Educational Objectives (PEO's)

The BCA program describe accomplishments that graduates are expected to attain within five to seven years after graduation

- PEO 1 - To impart advance knowledge about various sub-domains related to the field of computer applications
- PEO 2 - To provide the strong character to uphold the spiritual and cultural values of our country to make students acceptable to both industries and higher education.

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- PEO 3 - Graduates will be capable of attaining higher position in their professional carrier, capable to do quality research by strengthening their mathematical, scientific and basic engineering fundamentals.
- PEO 4 - Graduate will be capable of adopting the changing technologies, tools, and industrial environment.
- PEO 5 - Graduates will promote collaborative learning and spirit of team work through multidisciplinary projects and diverse professional activities.

Program Specific Outcomes (PSO's)

After the successful completion of BCA program, the students are expected to

- PSO 1 - Develop proficiency in problem solving and logical thinking skill.
- PSO 2 - To impart the knowledge of programming languages, web designing, networking and Software development cycle.
- PSO 3 - Enrich the communicative ability to present orally throughout all the stages of Software development process
- PSO 4 - Learn latest development and technologies in IT and Communications system.
- PSO 5 - Implementation of professional engineering solutions for the betterment of society keeping the environmental context in mind, be aware of professional ethics and be able to communicate effectively.

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Programme Outcome (PO's)

On successful completion of the BCA program

- PO 1 - Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design of computer based systems of varying complexity.
- PO 2 - Scientific reasoning/ Problem analysis: Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science.
- PO 3 - Problem solving: Able to provide software solutions for complex scientific and business related problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
- PO 4 - Environment and sustainability: Understand the impact of software solutions in environmental and societal context and strive for sustainable development.
- PO 5 - Modern tool usage: Use contemporary techniques, skills and tools necessary for integrated solutions.
- PO 6 - Ethics: Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude.
- PO 7 - Cooperation / Team Work: Function effectively as member or leader on multidisciplinary teams to accomplish a common objective.

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- PO 8 - Communication Skills: An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups.
- PO 9 - Self-directed and Life-long Learning: Graduates will recognize the need for self- motivation to engage in lifelong learning to be in par with changing technology.
- PO 10 - Enhance the research culture and uphold the scientific integrity and objectivity

Regulations Governing the Degree
of
Bachelors of Computer Applications (BCA) - 2016

DAYANANDA SAGAR UNIVERSITY

Regulations Governing the

Degree of **Bachelor Of Computer Applications (BCA)- 2015**

Preamble

The School of Computer Applications has been established to nurture fresh talent in the field of Information Technology equipping them with plethora of skills to choose an area of interest at an early age. The School firmly believes that theoretical knowledge supported by ample in-depth practical exposure are required to meet the challenges of this ever changing field. The courses offered aims at providing students key knowledge in the area of computer science and predominantly the applications of the theoretical knowledge covered during the course.

At the Under Graduate level, a student goes through the foundation courses in Computer Science, Mathematics and Humanities. The department ensures that the courses cover both Core and Electives as required.

DEFINATIONS OF KEY WORDS

i. **Academic Year:** Two consecutive odd and even semesters and a summer term for make up if required.
ii. **Course:** Usually referred to as a subject, a course may consist of any of Lecture/Tutorials/Laboratory/ Practical /Seminar/Mini project/Project work.
iii. **Credit:** A unit by which the course work is measured. One credit is equivalent to one hour of lecture or tutorial or two hours of laboratory/practical/workshop practice per week.
iv. **Credit Point:** It is the product of grade point and number of credits per course.
v. **Cumulative Grade Point Average (CGPA):** It is the measure of overall cumulative performance over all semesters. It is expressed upto two decimal places.
vi. **First Attempt:** If a candidate has completed all formalities of academic requirement in a term and become eligible to attend the examinations and attend all the end semester examinations, such attempt shall be considered as first attempt.
vii. **Grade Point:** It is a numerical weight allotted to each letter grade on a 10-point scale.
viii. **Letter Grade:** It is an index of the performance in a said course. Grades are denoted by alphabets.
ix. **Programme:** An educational activity leading to award of a Degree or Certificate.
x. **Semester Grade Point Average:** Is measure of performance during a semester. It shall be expressed up to two decimal places.
xi. **Transcript:** Based on the grades earned, a grade certificate shall be issued after every semester to the candidate registered,

RULES AND REGULATIONS

1. BCA programme offered by the DSU shall be governed by the BCA Rules and Regulations.

2. The BCA rules and regulations shall be applicable to any new discipline(s) that may be introduced in future.

3. A candidate becomes eligible for the award of the BCA degree after fulfilling all the academic requirements as prescribed by the BCA Rules and Regulations.

4. ACADEMIC SESSION

4.1 Each academic session is divided into two semesters of approximately sixteen weeks duration and a summer term: an odd semester (August -December), an even semester (January - May) and summer term or Make up term June- August.

4.2 The Board of Management approved schedule of academic activities for a session, inclusive of dates for registration, mid-semester and end-semester examinations, vacation breaks etc, shall be laid down in the Academic Calendar for the session.

5. ELIGIBILITY FOR ADMISSION

5.1 Admission to First Year BCA shall be open to candidates who have passed the second year pre-University or XII standard or equivalent examination recognised by the University.

5.2 The candidate shall have studied and passed English as one of the courses and secured not less than fifty percent (50%) marks in aggregate Eligibility shall be 45% in case of candidates belonging to SC/ST and OBC candidates from Karnataka.

6. ATTENDANCE

6.1 Candidates are required to attend all the classes (Lectures, Tutorials, Activitiesetc) for which they have been registered.

6.2 Candidates will have to attend all classes. A candidate shall not be allowed to appear for the end semester examination if his/her attendance falls below 85% in each course and will be awarded an "F" grade in that course.

6.3 A provision of condonation of 10% of the attendance by the Vice-chancellor on the specific recommendation of the chairman of the department and Dean, showing reasonable cause such as medical grounds,

6.4 The candidates shall be informed about their attendance position periodically by the department and cautioned to make up the shortage.

7. LEAVE OF ABSENCE

7.1 If the period of leave is for a short duration (less than two weeks), prior application for leave shall have to be submitted to the Chairman of the Department concerned stating fully the reasons for the leave requested for along with supporting document(s). Such leave will be granted by the Chairman of the Department.

7.2 Absence for a period not exceeding two weeks in a semester due to sickness or any other unavoidable reasons for which prior application could not be made may be

condoned by the Chairman of the Department provided he/she is satisfied with the explanation.

7.3 If the period of absence is likely to exceed two weeks, a prior application for grant of leave will have to be submitted through the Chairman of the Department to the Dean with supporting documents in each case; the decision to grant leave shall be taken by the Dean on the recommendation of the Chairman of the Department.

7.4 The Dean on receipt of an application also decide whether the candidate be asked to withdraw from the course for that particular semester because of long absence.

7.5 It will be the responsibility of the candidate to intimate the concerned course instructor(s) regarding his/her absence before availing the leave.

7.6 In exceptional circumstances, the Dean in consultation with the Vice Chancellor may relax any of the above requirements.

8. CONDUCT AND DISCIPLINE

8.1 Candidates shall conduct themselves within and outside the precincts of the DSU in a manner befitting the candidates of an University of national importance. The DSU has a separate ordinance Code and Conduct of Candidates which is applicable to all candidates of the DSU.

9. COURSE STRUCTURE

9.1 Medium of instruction, examination and project reports shall be in English.

9.2 Teaching of the courses shall be reckoned in credits; Credits are assigned to the courses based on the following general pattern:

a. One credit for each lecture period
b. One credit for each 2 hours tutorial period
c. One credit per two hours for each Activity session.

9.3 Credits for Seminar, Project are as indicated in the scheme/curriculum of teaching.

9.4 In order to qualify for a BCA degree of the DSU, a candidate is required to complete the credit requirement as prescribed in the scheme/curriculum for a particular programme

9.5 The course work requirements may be broadly divided into following four main groups of subjects: i. Core Courses ii. Department Electives iii. Activities iv. Project

9.6 BCA Programme will have a curriculum and syllabus for the course approved by the Board of Management. Board of Studies will discuss and recommend the syllabus of the under graduate course offered by the department from time to time before sending the same to the Academic Council. Academic

Councilwill consider the proposal from the Board of Studies and make recommendations to the Board of Management for consideration and approval. For the approved course, the copyright will be with DSU.

9.7 Faculty Advisor: To help the candidates in planning their courses of study and getting general advice on the academic programme, the concerned department will assign a Faculty Advisor to each candidate.

9.8 Project supervisor: Project supervisor (s) for a candidate will be allotted from amongst the faculty members.

10. REGISTRATION

10.1 Every candidate is required to register for approved courses through the assigned Faculty Advisor at the commencement of each semester on the day fixed for such registration and notified in the Academic Calendar. The Dean may cancel the registration of one or more courses if they are found to violate some rules or if there are restrictions imposed due to disciplinary reasons.

10.2 Only those candidates will be permitted to register who have :

a. cleared all University, Hostel and Library dues and fines (if any) of the previous semesters,
b. paid all required advance payments of University and Hostel dues for the current semester,
c. not been debarred from registering on any specific ground.

10.3 During registration following conditions must be fulfilled :

a. A student must pass all first year courses before registering for the third year.

b. Students obtaining grade 'F' in any core subject in any semester may clear it in the subsequent summer term examination or must repeat it in the next appropriate semester when it is offered.

c. Candidates who obtain grade 'F' in an elective subject may similarly clear the backlog in the summer term examination or, alternatively, register for any other elective subject offered in the next semester.

d. In case of failure in Activity/Practical course the candidate in any semester may clear it in the subsequent summer term examination or semester examination

e. In case of candidate fails in continuous evaluation Activity/Practicalhe /she shall reregister in the summer term or subsequent semester.

10.4 A candidate who obtains a CGPA lower than 5.00 may be permitted by the Dean on the recommendations of the Concerned Department to register for one or more courses to improve the grades and CGPA. In such cases courses with lower grades shall be expunged from the Grade Card.

10.5 When a candidate re-registers for a subject, in accordance with clause 10.4 his/her new grade will be used for SGPA/CGPA calculation.

10.6 Candidates may add and drop course(s) with the concurrence of the Faculty Advisor, and under intimation to the concerned course instructors and the academic section provided this is done within the date mentioned in the Academic Calendar.

11. SUMMER TERM

11.1 A summer term course may be offered by a department and with the approval of the dean. A candidate shall be allowed to register for a maximum of three courses during a summer term.

11.2 Summer term courses will be announced by the Academic Affairs Office at the end of the even semester before the commencement of the end semester examination. A candidate will have to register for summer term courses by paying the prescribed fees within the stipulated time in the announcement.

11.3 The total number of contact hours in any summer term course will be the same as in the regular semester course. The assessment procedure in a summer term course will also be similar to the procedure for a regular semester course.

11.4 Candidates granted semester drop by the Board of governors, on medical ground, shall be allowed to clear the concerned courses in summer term subject to conditions as stated under Clause 11.1, 11.2.and 11.3.

11.5 Candidates awarded `F' grades in regular semester shall only be allowed to clear the concerned courses in summer term, subject the conditions as stated under Clause 11.1, 11.2, 11.3.

12. DURATION OF THE PROGRAMME

12.1 Normally a candidate should complete all the requirements for BCA Programme in three years. However, academically weaker candidates who do not fulfil some of the requirements in their first attempt and have to repeat them in subsequent semesters may be permitted up to six consecutive years (from the first year registration) to complete all the requirements of the degree.

13. TEMPORARY WITHDRAWAL FROM THE INSTITUTE

13.1 Candidate who has been admitted to an undergraduate programme of the University may be permitted to withdraw temporarily from the University on the grounds of prolonged illness or grave calamity in the family for a period of one semester or more, provided:

a. he/she applies to the University within 6 weeks of the commencement of the semester or from the date he last attended his/her classes whichever is later, stating fully the reasons for such withdrawal together with supporting documents and endorsement of his/her guardian;

b. the University is satisfied that, counting the period of withdrawal, the candidate is likely to complete his/her requirements of the BCA within the time limits specified in Clause 13.1 above;

c. there are no outstanding dues or demands in the University/ Hostel /Department/ Library.

13.2 Normally, a candidate will be permitted only one such temporary withdrawal during his/her tenure as a candidate of the undergraduate programme

14. TERMINATION FROM THE PROGRAMME

14.1 If a candidate fails to secure a CGPA of 4.0 in two consecutive semesters will not be allowed to continue in the BCA programme.

14.2 A candidate may also be required to leave the University on disciplinary grounds.

14.3 On having been found to have produced false documents or having made false declaration at the time of seeking admission.

14.4 On having been found to be pursuing regular studies and/or correspondence courses(leading to degree or diploma) in any other college, university or an educational institution.

14.5 On having been found to be concurrently employed and performing duty or carrying out business in contravention to academic schedules of the University and without approval from the University.

15. GRADING

15.1 There will be continuous assessment of a candidate's performance throughout the semester and grades will be awarded by the concerned course instructor and/or the appropriate committee appointed for this purpose on the following basis.

15.2 The grading will normally be based on the i) Continuous Evaluation and ii) End Semester Examination.

15.3 Theoretical subjects: the evaluation will be based on instructor's continuous assessment, two internal assessment tests and an end semester examination.

15.4 Activity/ Laboratory Courses: the evaluation will be based on instructors continuous assessment, a test and end semester examination.

15.5 The weight age assigned to different components of continuous assessment will be announced by the concerned instructor(s) in the beginning of the semester.

15.6 The results of performance of the candidates in the Continuous Assessment/ Internal Assessment Test shall be announced by the instructors.

15.7 In case of seminar, evaluation will be as determined by the grade awarding committee.

15.8 Mini project /Projects will be based on guides continuous evaluation and end semester examination by a evaluation committee.

15.9 The results of performance of the candidates in the end semester examination shall be announced by the controller of Examinations.

16.CONTINUOUS EVALUATION

16.1 Candidate shall secure minimum of 50 % of marks in continuous evaluation to be eligible to appear for the end semester examination.

17. INTERNAL ASSESSMENT

17.1 Average of Two best out of three tests shall be the internal marks in theory courses.
17.2 Internal Assessment for Activities shall be based on continuous evaluation.
17.3 Candidate shall secure minimum of 50 % of marks in Internal Assessment be eligible to appear for the end semester examination.
17.4 There shall be no improvement of Internal assessment marks if they are above 50%.

18. MAKE-UP EXAMINATIONS

18.1 Candidates who have missed the Internal Assessment Test on valid reasons take up make up examination with prior approval of the chairman of the department.

18.2 Permission to take a make-up examination will be given under exceptional circumstances such as participating in the University activity, admission to a hospital due to illness and a calamity in the family at the time of Internal Assessment Test.

19. METHOD OF AWARDING LETTER GRADES

19.1 Relationships among Grades, Grade points and % of marks are listed in Table 1.

Table 1Grade, Points, Grade Description and % of marks

Grade	Grade points	Description	% Marks
O	10	Outstanding	90 to 100
A+	9	Excellent	80 to89
A	8	Very good	70 to79
B+	7	Good	60 to69
B	6	Above Average	55 to59
C	5	Average	50 to54
P	4	Pass	45 to 49
E	2	Pass with low Grades	40 to44
F	0	Fail	less than 40
AP	-	Audit pass	
AF	-	Audit fail	

20. DESCRIPTION OF GRADES

20.1 Table 1 shows the relationships among the grades, grade points and percentage of marks.

20.2 A candidate getting E grade in odd/even semester will have to improve the grade by taking re-examination conducted in the following summer term or the next corresponding semester.

20.3 If a candidates obtains E grade on second attempt he/she shall reregister for the same core course. In case of elective course he/she can register for the same or any other elective course offered.

20.4 A candidate can take re-examination in maximum of three courses in a given semester.

20.5 A candidate shall have to repeat all core courses in which he/she obtains 'F' Grades until a passing grade is obtained.

20.6 In case of a candidate getting F grade in an elective course he/she may take the same course or any other elective course offered.

20.7 'E' Grades are not counted in the calculation of the CGPA; however, these are counted in the calculation of the SGPA.

20.8 An 'IC' grade denotes incomplete performance in the course. A candidate will be eligible for an 'IC' grade provided he/she has met the attendance criterion. It may be awarded in case of absence on medical grounds or other special circumstances. The request is to be made to the chairman of the department through the faculty advisor.

20.9 A candidate getting IC grade in odd/even semester will have to improve the grade by taking re-examination conducted in the following summer term or the next corresponding semester.

20.10 Requests for IC-grade should be made at the earliest but not later than the last day of end semester examination..

21. Evaluation of Performance

21.1 The performance of a candidate will be evaluated in terms of the Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester, Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters.

21.2 A candidate who completes the course and credit requirements but has CGPA 5.0 which is below the minimum required for award of degree can take additional credits to make up the CGPA.

21.3 The Earned Credits (EC) are defined as the sum of course credits for courses in which candidates have been awarded grades between O to P. (Table 1)

21.4 Points earned in a semester = (Course credits *x* Grade point) for Grades O - E

21.5 The SGPA is calculated on the basis of grades obtained in all courses, except audit courses and courses in which F grade or below, registered for in the particular semester.

$$\text{SGPA} = \frac{\text{Points secured in the semester(O} - \text{E Grades)}}{\text{Credits registered in the semester, excluding audit}}$$

21.6 The CGPA is calculated on the basis of all pass grades, except audit courses and courses in which E grade obtained in all completed semesters.

$$\text{CGPA} = \frac{\text{Cumulative points secured in all the passed courses(O} - \text{E Grades)}}{\text{Cumulative registered credits, excluding audit}}$$

22. WITHHOLDING OF GRADES

22.1Grades shall be withheld when the candidate has not paid his/her dues or when there is a disciplinary action pending against him/her

23. CONVERSION OF CGPA INTO PERCENTAGE

23.1 Conversion formula for the conversion of CGPA into percentage is

$$\text{Percentage of Marks Scored} = (\text{CGPA Earned} - 0.75) \times 10$$

24.ELIGIBILITY FOR THE AWARD OF BCADEGREE

A candidate shall be declared to be eligible for the award of BCA degree if he/she has :

24.1 Completed all the credit requirements for the degree with a CGPA 5.0 or higher at the end of the programme.

24.2 Satisfactorily completed all the mandatory audit courses;

24.3 No dues to the University, Department, Hostels.

24.4 No disciplinary action is pending against him/her.

25. AWARD OF DEGREE

The award of BCA degree must be recommended by the Academic Council and approved by the Board of Management of the DSU.

26. REPEAL AND SAVINGS

Notwithstanding anything contained in these Regulations, the provisions of any guidelines, orders, rules or regulations in force at the University shall be inapplicable to the extent of their inconsistency with these Regulations.The Academic Council of University may revise, amend or change the regulations from time to time.

27. INTERPRETATION

Any questions as to the interpretation of these Regulations shall be decided by the University, whose decision shall be final. The University shall have the powers to issue clarifications to remove any doubt, difficulty or anomaly which may arise during the implementation of the provisions of these Regulations.

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DEPARTMENT OF COMPUTER APPLICATIONS

Code of Conduct

1. Students should pay the required fees , Tuition, Hostel/Bus and Mess Fee as stipulated by the University on time, failing which Students would not be allowed to register for courses,will not be allowed to stay in the hostel, will not be permitted to attend the classes orwrite examinations.
2. Students should fully aware that possession of cell phone / any electronic devices inside the examination hall is strictly prohibited and if violated, liable to be confiscated and punished as per the rules of the University, Students should also aware that impersonation in anyform will lead to expulsion from the University.
3. Students should fully aware that the Chief Warden, Resident Warden, Mentor, Faculty or any authorized personnel of the University are empowered to check and verify the contents including photos/videos in my Laptop/Mobile phones any time on misuse of electronic gadgets which are against the norms of the University.
4. Students should aware that smoking or consumption or distributing tobacco/alcohol in any formon the campus is punishable and Students will be liable to be suspended / Debarred/Expelledfrom the University.
5. Students should aware that Possessing, consuming or distributing harmful or illegal narcotic drugs and psychotropic substances is a criminal offense as per The Narcotic Drugs and Psychotropic Substances Act ,1985 which will lead to dismissal from the University.
6. Students should not disturb the peace, destroy, damage or deface University property, or injure any person or physically manhandle under the guise of

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intimidation, initiation and extortion in any form for any purpose, failing which students shall be liable for thepunishment as per the University code of conduct.

7. Students should fully aware that, while the University encourages healthy interaction between boys and girls, it prohibits eve teasing/sexual harassment, any indecent behavior or any physical contact or public display of affection (PDA) among student. Such conducts are prohibited under the Sexual Harassment of Women in workplace (Prevention, Prohibition & Redressal Act, 2013 and as per UGC Regulations. Those involved in such activities will be summarily expelled from the University and may also be liable for criminal action.
8. My parents and students agree to receive information regarding my studies via all communication modes such as email/post/messages at any time from the University.
9. Students should aware of the refund policy of the University for all the fees paid during the enrollment process

DAYANANDA SAGAR UNIVERSITY

KUDLU GATE, BENGALURU–560 068, KARNATAKA.

SCHOOL OF ENGINEERING

SCHEME & SYLLABUS
FOR
BACHELOR OF COMPUTER APPLICATIONS
(BCA)

(3rd & 4th Semesters)

(With effect from 2022-23)

DAYANANDA SAGAR UNIVERSITY

School of Engineering

DEPARTMENT OF COMPUTER APPLICATIONS

I SEM

SL	PROGRAM CODE	COURSE CODE	COURSE TITLE	CR / AU	SCHEME OF TEACHING					PREREQUISITE	
					L	T	P	S / P	C	SEM	COURSE CODE
1	106	21CA1101	MATHEMATICS-I	CR	03	01	--	--	04	***	***
2	106	21CA1102	FUNDAMENTALS OF PROGRAMMING	CR	03	--	--	--	03	***	***
3	106	21CA1103	COMPUTER ORGANIZATION – I	CR	03	--	--	--	03	***	***
4	106	21CA1104	WEB PROGRAMMING	CR	03	--	02	--	04	***	***
5	106	21CA1105	ACCOUNTING AND FINANCIAL MANAGEMENT	CR	03	--	02	--	04	***	***
6	106	21CA1106	ENGLISH IN PRACTICE	CR	02	--	02	--	03	***	***
7	106	21CA1107	PROGRAMMING LAB	CR	-	-	02	--	01	***	***
8	106	21CA1108	COMPUTER ORGANIZATION LAB	CR	-	-	02	--	01	***	***
					16	**01**	**10**	--	**23**		
9	106	21AU0004	CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS	AU	02	--	--	--	***	***	***

CR – Credit, AU – Audit, L – Lecture, T – Tutorial, P – Practical, S/P – Seminar/Project, C – No. of Credits

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II SEM

SL	PROGRAM CODE	COURSE CODE	COURSE TITLE	CR / AU	SCHEME OF TEACHING					PREREQUISITE	
					L	T	P	S / P	C	SEM	COURSE CODE
1	106	21CA1201	MATHEMATICS-II	CR	03	01	--	--	04	***	***
2	106	21CA1202	OBJECT ORIENTED PROGRAMMING USING JAVA	CR	03	--	--	--	03	***	***
3	106	21CA1203	DATA STRUCTURES	CR	03	--	--	--	03	I	21CA1102
4	106	21CA1204	COMPUTER ORGANIZATION II	CR	03	--	--	--	03	I	21CA1103
5	106	21CA1205	TECHNICAL COMMUNICATIONS	CR	02	--	02	--	03	***	***
6	106	21CA1206	OOP LAB	CR	-	-	02	--	01	***	***
7	106	21CA1207	DATA STRUCTURES LAB	CR	-	-	02	--	01	***	***
8	106	21CA1208	COMPUTER ORGANIZATION LAB	CR	-	-	02	--	01	***	***
9	106	21CA1209	SEMINAR	CR	--	--	--	02	01		
					14	**01**	**08**	**02**	**21**		
10	106	21AU0008	ENVIRONMENT AND PUBLIC HEALTH	AU	02	--	--	--	01	***	***

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School of Engineering

DEPARTMENT OF COMPUTER APPLICATIONS

V SEM

SL	PROGRAM CODE	COURSE CODE	COURSE TITLE	CR / AU	SCHEME OF TEACHING					PREREQUISITE	
					L	T	P	S / P	C	SEM	COURSE CODE
1	106	21CA2301	COMPUTER NETWORKS	CR	03	--	02	--	04	***	***
2	106	21CA2302	HUMAN COMPUTER INTERFACE	CR	03	--	02	--	04	***	***
3	106	21CA2303	SOFTWARE ENGINEERING USING AGILE APPROACH	CR	03	--	02	--	04	***	***
4	106	21CA2304	NUMERICAL METHODS	CR	03	--	02	--	04	***	***
5	106	21CA2305	ANALYSIS AND DESIGN OF ALGORITHMS	CR	03	--	--	--	03	II	21CA1203
6	106	21CA2306	OPERATING SYSTEMS	CR	03	--	-	--	03	***	***
7	106	21CA2307	ANALYSIS AND DESIGN OF ALGORITHMS LAB	CR	-	-	02	--	01	***	***
8	106	21CA2308	OPERATING SYSTEMS LAB	CR	-	-	02	--	01	***	***
					18	**--**	**12**	**--**	**24**		
9	106	21AU0021	KANNADA KALI – II	AU	02	--	--	--	--	***	***
		21AU0025	KANNADA MANASU – II								

CR – Credit, AU – Audit, L – Lecture, T – Tutorial, P – Practical, S/P – Seminar/Project, C – No. of Credits

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DEPARTMENT OF COMPUTER APPLICATIONS

IV SEMESTER

SL	PROGRAM CODE	COURSE CODE	COURSE TITLE	CR / AU	SCHEME OF TEACHING					PREREQUISITE	
					L	T	P	S / P	C	SEM	COURSE CODE
1	106	21CA2401	OBJECT ORIENTED ANALYSIS AND DESIGN	CR	03	--	02	--	04	***	***
2	106	21CA2402	WEB TECHNOLOGY	CR	03	--	--	--	03	I	21CA1104
3	106	21CA2403	DATABASE SYSTEMS	CR	03	--	--	--	03	***	***
4	106	21CA2404	SOFTWARE TESTING	CR	03	--	02	--	04	***	***
5	106	21CA24XX	PROFESSIONAL ELECTIVE – I	CR	02	01	02	--	04	***	***
6	106	21CA2405	WEB TECHNOLOGY LAB	CR	-	-	02	--	01	***	***
7	106	21CA2406	DATABASE SYSTEMS LAB	CR	-	-	02	--	01	***	***
8	106	21CA2407	MINOR PROJECT	CR	-	-	--	04	02	***	***
					14	**01**	**10**	**04**	**22**		

PROFESSIONAL ELECTIVE – I

SL	COURSE CODE	COURSE TITLE
1	21CA2408	SYSTEM ADMINISTRATION
2	21CA2409	IOT
3	21CA2410	UNIX INTERNALS
4	21CA2411	INTERNET & WEB ARCHITECTURE

CR – Credit, AU – Audit, L – Lecture, T – Tutorial, P – Practical, S/P – Seminar/Project, C – No. of Credits

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V SEMESTER

SL	PROGRAM CODE	COURSE CODE	COURSE TITLE	CR / AU	SCHEME OF TEACHING					PREREQUISITE	
					L	T	P	S / P	C	SEM	COURSE CODE
1	106	21CA3501	INFORMATION AND NETWORK SECURITY	CR	02	01	--	--	03	***	***
2	106	21CA35XX	PROFESSIONAL ELECTIVE –II	CR	02	01	02	--	04	***	***
3	106	21CA35XX	PROFESSIONAL ELECTIVE – III	CR	02	01	02	--	04	***	***
4	106	21CA3502	INFORMATION AND NETWORK SECURITY LAB	CR	-	-	02	--	01	***	***
5	106	21CA3581	PROJECT STAGE I	CR	-	-	--	08	04	***	***
6	106	21CA2504	LIBERAL STUDIES 5	CR	01				01		
					07	**03**	**06**	**08**	**17**		

CR – Credit, AU – Audit, L – Lecture, T – Tutorial, P – Practical, S/P – Seminar/Project, C – No. of Credits

PROFESSIONAL ELECTIVE – II & III

SL	COURSE CODE	COURSE TITLE
1	21CA3505	BIG DATA ANALYTICS USING HADOOP
2	21CA3506	DATABASE ADMINISTRATION
3	21CA3507	MOBILE PROGRAMMING

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4	21CA3508	MOBILE SECURITY
5	21CA3509	LINUX OPEN SOURCE SYSTEM
7	21CA3510	CLIENT/ SERVER SIDE SCRIPTING
8	21CA3511	BLOCKCHAIN TECHNOLOGIES
9	21CA3512	COMPUTER GRAPHICS AND MULTIMEDIA

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VI **SEMESTER**

SL	PROGRAM CODE	COURSE CODE	COURSE TITLE	CR / AU	SCHEME OF TEACHING					PREREQUISITE	
					L	T	P	S/P	C	SEM	COURSE CODE
1	106	21CA36XX	PROFESSIONAL ELECTIVE –IV	CR	02	01	02	--	04	***	***
2	106	21CA36XX	PROFESSIONAL ELECTIVE –V	CR	02	01	02	--	04	***	***
3	106	21CA3682	PROJECT STAGE II	CR	-	-	12	--	06	***	***
					04	**02**	**14**	**--**	**14**		

TOTAL CREDITS:123

CR – Credit, AU – Audit, L – Lecture, T – Tutorial, P – Practical, S/P – Seminar/Project, C – No. of Credits, CIA – Continuous Internal Assessment

PROFESSIONAL ELECTIVE – IV & V

SL	COURSE CODE	COURSE TITLE
1	21CA3601	ADVANCE DATABASE (NOSQL)
2	21CA3602	WEB ADMINISTRATION
3	21CA3603	GAME PROGRAMMING

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4	21CA3604	NETWORK ADMINISTRATION
5	21CA3605	ETHICAL HACKING
6	21CA3606	WEB SECURITY
7	21CA3607	DATA SCIENCE
8	21CA3608	CLOUD COMPUTING
9	21CA3609	ANIMATIONS

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SEMESTER/YEAR	**:**	**I SEM / I YEAR**
COURSE CODE	**:**	**21CA1101**
TITLE OF THE COURSE	**:**	**MATHEMATICS-I**
L: T: P: S/P : C	**:**	**03-01-00-00-04**

Course Objectives	The Curriculum supports the prerequisites to enhance their Mathematical knowledge towards their understanding mathematical Concepts and help them to persuade research work in concerned fields with the help of Mathematical approach.
Course outcomes	At the end of the course student will be able to 1. understand and use counting principle, use Propositional calculus in Theorem proving 2. use suitable algebraic structures to model the given scenario/system 3. use constructions used in proofs as algorithms

Module 1	**MATRICES** Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Eigen values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem (Statement only) Rank of a matrix, Row reduced echelon form and normal form Solution of homogeneous and nonhomogeneous system of equations. Practical's: Solving problems under matrices using FOSS TOOLS SCILAB/Maxima DETERMINANTS: Definition, Minors, Cofactors, Properties of Determinants Cramer's rule	09 hrs
Module 2	**SETS AND RELATIONS** SETS: Sets, Subsets, Types of Sets, Operation on Sets, Applications. RELATIONS AND FUNCTIONS: Definition, Types of functions, Types of relations with illustrations and graphs	09 hrs
Module 3	**DIFFERENTIAL CALCULUS** Limit , Continuity, Differentiation , Product rule Quotient rule Successive differentiation, Leibnitz theorem for finding nth derivative of product of functions(only statement) Partial derivatives, homogeneous functions Euler's theorem (only statement) maxima and minima, Taylor's series and Maclaurin's Series (without proof). Practical's: Solutions Using FOSS TOOLS SCILAB/MAXIMA	09 hrs
Module 4	**DIFFERENTIAL EQUATIONS** Different types of differential equations, solving different equations	08 hrs
Module 5	**ALGEBRAIC STRUCTURES** Introduction, operations, semi-groups, groups, subgroups, normal subgroups, isomorphism and homomorphism, rings, integral domains and fields, Polynomials over a field.	10 hrs
Textbooks	1. Dr. P .R .Vittal : MATHEMATICAL FOUNDATION	
Reference	2. Shanti Narayan, "Differential Calculus", S Chand & Company.	

Books
3. Shanthi Narayan , “Matrices and determinant” , S. Chand and company LTD
4. B.S. Grewal, “Elementary Engineering Mathematics”, 34th Ed. Delhi Khanna Publishers.
5. Das BC and Mukherjee, Differential Calculus, Calcutta, U.N. Dhar Publishers.

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SEMESTER/YEAR : I SEM / I YEAR

COURSE CODE : 21CA1102

TITLE OF THE COURSE : FUNDAMENTALS OF PROGRAMMING

L: T: P: S/P : C : 03-00-00-00-03

Course Objectives	The objective of the subject is to teach the student the basics of Programming starting with simple problem solving techniques implemented using Python language	
Course outcomes	At the end the course the students will 1. understand Programming concepts, building blocks of a program, different constructs file i/o operations 2. Be able to design using advanced concepts such as functions, modules and regular expressions in designing programs.	
Module 1	**INTRODUCTION TO PROGRAMMING** Introduction to problem solving, algorithms, flowcharts, art of Programming language, programming environments, overview of compilations. Data types, constants and variables, Arithmetic expressions, operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity	09 hrs
Module 2	**BUILDING BLOCKS** Branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement. break, continue statement	09 hrs
Module 3	Iterative statements: For, while, and do-while loop, jumps in loops. Arrays, pointers and structures.	08 hrs
Module 4	**SEQUENCES , FILES AND DICTIONARIES** Sequences, FILE I/O Operations, dictionaries and sets	09 hrs
Module 5	**PROGRAMMING CONCEPTS** Functions , modules and regular expressions	10 hrs

Text Books

1. Programming in Python 3 (Second Edition) A Complete Introduction to the Python Language by Mark Summerfield
2. Head First Python – Paul Barry
3. Gottfried, Byron S., Programming with C, Tata McGraw Hill

Reference Books

1. Problem Solving With C: Jones and Harrow, WILEY INDIA PVT LTD.
2. An Introduction to Programming and Problem Solving With Pascal, G. Michael Schneider Steven W. Weingart David M. Perlman, WILEY INDIA PVT LTD.

SOFTWARES C/PYTHON

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SEMESTER/YEAR : I SEM / I YEAR
COURSE CODE : 21CA1103
TITLE OF THE COURSE : COMPUTER ORGANIZATION - I
L: T: P: S/P : C : 03-00-00-00-03

Course Objectives

This course aims at providing an overview of basic digital design techniques, basic structure of a digital computer and its organization.

Course outcomes

At the end of the course student will be able

1. to demonstrate knowledge of binary number theory, Boolean algebra and binary codes.
2. to analyse and design combinational systems using
3. standard gates and minimization methods (such as Karnaugh maps,
4. Quine-McCluskey Algorithm).

   To analyse and design combinational systems composed of Standard combinational modules, such as multiplexers and decoders.

5. to analyse the given problems and design sequential Circuits

Module 1 **INTRODUCTION TO DIGITAL COMPUTER** 06 hrs

Concept of Digital Computer, Types of Software – System software / Application software / Utility Software. Compilers, Interpreters, Assemblers, Linker, Loader. System Bus Structure

Module 2 **NUMBER SYSTEM AND LOGIC DESIGN MINIMIZATION TECHNIQUES** 06 hrs

Introduction to number system, Signed Binary Representation, Logic gates and Boolean Algebra.

Module 3 **COMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS** 06 hrs

Minimization Techniques and circuit design, Codes and Arithmetic operation, Combinational Circuits Design

Module 4 **COMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS(CONTD)** 06 hrs

Multiplexers, De-multiplexers, decoders, Sequential circuit Design Counter and registers

Module 5 **INPUT/ OUTPUT AND MEMORY ORGANIZATION OF COMPUTER** 06 hrs

I/O Devices, Memory Systems, Interrupts and instruction cycle, Addressing modes

Text Book:

1. M. Morris Mano, “Digital Logic and Computer Design”, 10th Edition, Pearson Education, 2004.
2. Malvino. D. Leach, “Digital Principles and Applications”, 5th Edition, Tata McGraw Hill.
3. Floyd, “Digital Principles”, Pearson Education, 2002

Reference Books

1. Carl Hamacher, Z Varnesic and S. Zaky: Computer Organization, 5th Edition, McGraw Hill, 2002.
2. W. Stalling, “Computer Organization and Architecture”, 8th Edition, Pearson Education India, 2010.

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SEMESTER/YEAR	**:**	**I SEM / I YEAR**
COURSE CODE	**:**	**21CA1104**
TITLE OF THE COURSE	**:**	**WEB PROGRAMMING**
L: T: P: S/P : C	**:**	**03-00-02-00-04**

Course Objectives	This subject aims at providing an overview of Fundamentals of Web & Web Designing
Course outcomes	At the end of the course student will be able i) understand WWW, web servers, Markup languages, ii) design web pages for the given applications

		06 hrs
Module 1	Internet, History of Internet, Internet Protocols, Client-Server technology, World Wide Web (WWW), Evolution of web	
Module 2	Web Server, Web Browsers, Search Engines, Architecture of web site, Hypertext Transfer Protocol (HTTP), HTTPS, Security.	06 hrs
Module 3	Introduction to Hypertext Documents, Static and Dynamic web pages, Markup Language – Overview, HTML: Introduction, structure of HTML, Basic HTML tags	06 hrs
Module 4	HTML structure Tags, Content/ Media Tags, Working with Forms.	06 hrs
Module 5	Designing web pages for different applications.	06 hrs

Text Book	1. Fundamentals of Web Development by Randy Connolly, Richardo Hoa, Pearson Education Limited 2. Internet & World Wide Web: How to Program, Deitel and Deitel, Prentice Hall 3. Programming HTML Applications, Published by Oreilly
Reference Books	1. Internet and Introduction-CI Stems, TMH 2. Web Design, The Complete Reference, Thomas Powell, Tata MC Graw Hill

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SEMESTER/YEAR : I SEM / I YEAR
COURSE CODE : 21CA1105
TITLE OF THE COURSE : ACCOUNTING AND FINANCIAL MANAGEMENT
L: T: P: S/P : C : 03-00-02-00-04

Course Objectives	This paper provides conceptual knowledge of Financial accounting, familiarizes with methods of preparing Final Accounts of Sole Proprietorship concerns, provides understanding of the accounting procedure for different kinds of businesses and various ratios and abstracts of accounts which are required for the management to take strategic decisions.
Course outcomes	At the end of the course student will be able 1. To understand the principles and methodology of Nature of Financial Accounting 2. To know Basics of accounting 3. To do Analysis of financial statement 4. To know Indian economy. Fund flow Cash flow.

Module 1	Overview – Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting and Management Accounting, Accounting concepts and conventions, Accounting standards.	06 Hour
Module 2	Basics of accounting – Capital & Revenue items, Introduction to Double Entry System, Introduction to preparation of Journal, Ledger, Procedure for Recording and Posting journal entries and ledgers, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept.	06 Hour
Module 3	Analysis of financial statement: Introduction to Ratio Analysis, Uses of Ratio analysis, Simple problems of Ratio analysis, Analysis of Balance Sheet, Break-even analysis: Uses of Break – even analysis, simple problem solving in break-even analysis.	09 Hour
Module 4	Fund flow and Cash Flow: Preparation of Fund Flow statement, Analysis of Fund Flow statement, Schedule of Changes in Working Capital,	08 Hour
Module 5	Preparation of Cash Flow Statement, Analysis of Fund Flow statement.	09 Hour

Text Books	1) Narayanswami, “Financial Accounting: A Managerial Perspective”, PHI, 2nd Edition. 2) Mukherjee, “Financial Accounting for Management”, TMH, 1st Edition.
Reference Books	1) Gupta Ambrish, “Financial Accounting for Management”, Pearson Education, 2nd Edition. (2) Chowdhary, Anil, “Fundamentals of Accounting and Financial Analysis”, Pearson Education, 1st Edition.

Software: Tally – Not an open source, Wings (Open Source) , Dynamics GP. (Not open source).

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SEMESTER/YEAR	**:**	**I SEM / I YEAR**
COURSE CODE	**:**	**21CA1106**
TITLE OF THE COURSE	**:**	**ENGLISH IN PRACTICE**
L: T: P: S/P : C	**:**	**02-00-02-00-03**

Course Objectives

a. To enable students improve their lexical, grammatical competence.
b. To enhance their communicative skills.
c. To equip students with oral and appropriate written communication skills.
d. To inculcate students with employability and job search skills.

Course outcomes

1. Students achieve proficiency in English
2. Develop their professional communication skills
3. Acquire skills for placement

Module 1	**Grammar and Vocabulary**: Tense and Concord, word formation, Homonyms and Homophones	06 hrs
Module 2	**Listening and Speaking:** Common errors in Pronunciation (Individual sounds); Process description (Describing the working of a machine, and the manufacturing process), use of vocabulary and rendering.	06 hrs
Module 3	**Group Discussion**	06 hrs
Module 4	**Writing:** Interpretation of data (Flow chart, Bar chart), Referencing Skills for Academic Report Writing	06 hrs
Module 5	**Reading:** Reading Comprehension, Answering questions, Appreciation of creative writing.	06 hrs

Text Books

1. Dhanavel.S.P. English and Communication Skills for Students of Science and Engineering**,** Orient Blackswan Ltd., 2009.
2. Meenakshi Raman and Sangeetha Sharma**.** Technical Communication- Principles and Practice, Oxford University Press, 2009

Reference Books

1. Day.R A., Scientific English:A Guide for Scientists and Other Professional, 2nd ed. Hyderabad: Universities Press, 2000

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SEMESTER/YEAR	**:**	**II SEM / I YEAR**
COURSE CODE	**:**	**21CA1201**
TITLE OF THE COURSE	**:**	**MATHEMATICS –II**
L: T: P: S/P : C	**:**	**03-01-00-00-04**

Course Objectives To acquaint students with various Statistical methods, to develop skills pertaining to Data analysis, Modelling and Research design.

Course outcomes The students will

i) understand various statistical techniques that can be applied to real life situations. ii) study and appreciate discrete probability and it's uses

iii) understand and will be able to use operations research techniques to the given optimization problems

Module 1	BASICS OF STATISTICS **Measures of Central Tendency**-Mean(AM,GM,HM), Mode, Median, Standard deviation, Variance; **Correlation-** Bivariate data, bivariate frequency distribution. Concept of correlation between two variables, Types of correlation, Karl Pearson's coefficient of correlation (r), Spearman's rank correlation coefficient, Curve Fitting**;** **Regression**- Concept of regression, lines of regression, fitting of lines of regression by the least squares method, Regression coefficient.	06 hrs
Module 2	**DISCRETE PROBABILITY AND PROBABILITY DISTRIBUTIONS** Events, Conditional Probability and Independence, Univariate Probability Distributions, Bivariate Probability Distribution, Mathematical Expectation. Bivariate distribution, conditional and marginal distributions - Discrete distributions, discrete uniform, Binomial poison and geometric Distributions, Continuous distributions - Uniform, Normal, Exponential and Gamma distributions.	06 hrs
Module 3	**STATISTICAL INFERENCE** Test of significance- Elements of Hypothesis Testing : Null and Alternative hypotheses, Simple and Composite hypotheses, Critical Region, Type I and Type II Errors, Level of Significance and Size., Analysis of Variance (ANOVA) - Introduction: Heterogeneity and Analysis of Variance and Covariance,	06 hrs
Module 4	**STATISTICAL INFERENCE** Linear Hypothesis, Orthogonal splitting of total variation, Selection of Valid Error. Applications of the ANOVA technique to: one-way classified data, two-way classified Data, Time Series Analysis - Introduction: Examples of time series from various fields, Components of a times series, Additive and Multiplicative models. Trend and Seasonal Components: Estimation of trend by linear filtering (simple and weighted moving averages).	06 hrs
Module 5	**OPERATIONS RESEARCH** **Linear Programming** - Meaning and scope of OR. Definition of general LPP, Formulation of LPP, Solution of LPP by graphical method, Simplex algorithm, Transportation, Assignment and Sequencing Problems; **Project management**-CPM, PERT.	06 hrs

Text Books 1. Kossack, C.F. and Hensschkec, C.I., Introduction to Statistics and Computer Programming, Tata McGraw-Hill, New Delhi.
2. Taha : Operations Research: An Introduction : Mac Millan.

Reference Books
1. Chung K.L. (1983): Elementary Probability Theory with Stochastic Process, Springer / Narosa
2. Hoel, P. G. : Introduction to Mathematical Statistics (1962), John Wiley and Sons, New York.
3. Wayne L. Winston: Operations Research. Thomson, India 4th edition.

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SEMESTER/YEAR : II SEM / I YEAR

COURSE CODE : 21CA1202

TITLE OF THE COURSE : OBJECT ORIENTED PROGRAMMING USING JAVA

L: T: P: S/P : C : 03-00-00-00-03

Course Objectives This subject covers the basics of OOPS concepts such as Inheritance, Polymorphism, Event driven programming, Exceptions and Concurrent programming.

Course outcomes The students will

i) understand OOP concepts, programming blocks. Packages and interfaces.

ii) understand and use the exception handling and design programs with multithreading.

Module 1	**Basics of Object Oriented Programming (OOP)** Need for OO paradigm, Classes and objects, Constructors and Destructors, Access control, Inheritance, Abstraction, Encapsulation, Polymorphism, Overriding, String handling.	9 Hour
Module 2	**Programming blocks** Data types , variables, Identifiers, Key words, scope and life time of variables, operators, expressions, control statements, type conversion and casting.	9 Hour
Module 3	**Packages and Interfaces** Defining, Creating and Accessing a Package, importing packages, Interfaces, abstract Classes, implementing interface, variables in interface, extending interfaces.	9 Hour
Module 4	**Exception handling** Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, built in exceptions, creating own exception sub classes.	9 Hour
Module 5	**Multithreading :** Thread life cycle, creating threads, synchronizing threads, daemon threads, and thread groups.	09 Hour

Text Books

1. Java: How to Program, 8/e, Dietal, Dietal, PHI
2. The C++ Programming Language , Bjarne Stroustrup
3. Java: The complete reference, 7/e, Herbert Schildt, TMH.

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SEMESTER/YEAR	**:**	**II SEM / I YEAR**
COURSE CODE	**:**	**21CA1203**
TITLE OF THE COURSE	**:**	**DATA STRUCTURES**
L: T: P: S/P : C	**:**	**03-00-00-00-03**

Course objectives

The objective of the subject is to teach the student the usage of data structures using any Programming language.

Course outcomes

At the end of the course student will be able

1. To understand and explain linear and dynamic allocation of memory using array and linked list
2. To design programs for queue, stacks, sorting, Searching using linear data structures.
3. To use Nonlinear data structures to create Tree, Graphs.

Module 1 — **Searching Techniques** — 10 Hour

Preliminaries of algorithm, Algorithm analysis and complexity.

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion List Searches using Linear Search, Binary Search, Fibonacci Search.

Module 2 — **Sorting Techniques** — 10 Hour

Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort) and merging (merge sort) Algorithms.

Module 3 — **Stacks and Queues** — 10 Hour

Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, In-fix- to postfix Transformation, Evaluating Arithmetic Expressions.

Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round robin Algorithm, Enqueue, Dequeue, Circular Queues, Priority Queues.

Module 4 — **Linked Lists** — 10 Hour

Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, merging two single linked lists into one list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

Module 5 — **Trees and advance Data Structures** — 10 Hour

Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in-order and pre (post) order traversals. Adv Data Structures

Text Books

1. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
2. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH

Reference Books

1. Data Structure with C, Seymour Lipschutz, TMH
2. Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, University Press

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SEMESTER/YEAR	**:**	**II SEM / I YEAR**
COURSE CODE	**:**	**21CA1204**
TITLE OF THE COURSE	**:**	**Computer Organization II**
L: T: P: S/P : C	**:**	**03-00-00-00-03**

Course Objectives	This course aims to equip the student with assembly level programming using 8086 microprocessor.	
Course outcomes	At the end of the course student will be able 1. to understand the design the data part and control part of a processor 2. to understand memory technology, I/O systems and I/O operation and use them in the design of a computing system 3. To understand and appreciate the 8086 processor and program the same to solve problems.	
Module 1	**Introduction to the microprocessor and computer**: Internal processor architecture, Functional block diagram, Bus, Clock signals, addressing modes.	10 hrs
Module 2	**Programming 8086:** Data movement instructions, Arithmetic and logic instructions, Program control instructions, string instructions, programming techniques, examples. Modular programming: stacks, subroutines, Macros.	10 hrs
Module 3	**Assembler Directives**: Data Definition and Storage Allocation, Program Organization, Alignment, Program End, Value Returning Attribute, Procedure Definition, Macro Definition, Data Control, Branch Displacement, Header File, Inclusion, Target Machine Code, Generation Control Directives.	10 hrs
Module 4	Interrupts and interrupt routines, I\O interface and programming: Fundamental I\O considerations, Data transfer schemes9Programmed I\O, Interrupt I\O, DMA, System bus structure, Min.Max Modes, Application of 8259, 8255,8251,8257,8253	10 hrs
Module 5	**Introduction to other 16 bit 32 bit processors**: 80286, 386, 486, Pentium and Pentium Pro-processor.	10 hrs
Text Books	1. YuChang Liu & Glenn A Gibson, "Microcomputer systems: the 8086\8088 Family: Architecture, Programming and design", PHI 2. Microprocessor 8086 : Architecture, Programming and Interfacing : Mathur Sunil, PHI Learning	
Reference Books	1. Douglas V. Hall- Microprocessors and digital systems, MH. 2. Kenneth L. Short - Microprocessor and Programmed Logic '', PHI, 2nd Edition.	

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SEMESTER/YEAR : II SEM / I YEAR

COURSE CODE : 21CA1205

TITLE OF THE COURSE : TECHNICAL COMMUNICATIONS

L: T: P: S/P : C : 02-00-02-00-03

Course Objectives: To teach the elements of effective writing and communicative methods

Course outcomes:
1. The student will be able to communicate effectively orally and in written
2. Draft technical reports and proceedings.

Module 1	Preparation of Abstract, Synopsis Notices	06 hrs
Module 2	Technical Paper writing, Minutes of the meeting	06 hrs
Module 3	Letter Writing(Letters of enquiry, Permission, Regret, Reconciliation, Complaint, Breaking the ice.)	06 hrs
Module 4	Drafting Curriculum Vitae, Resume and Covering Letters. Job Applications	06 hrs
Module 5	Memo, E-mail Etiquette.	06 hrs

Text Books:
1. N. Krishnaswamy and T. Sri Raman, Creative English for communication, Macmillan Publication-2005.
2. Meenakshi Raman &Sangeeta Sharma, Technical Communication – Principles and Practice, oxford University press

Reference Books:
1. N. Krishnaswamy and T. Sriraman, Creative English for Communication Business Communication and Report Writing, Macmillan.

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SEMESTER/YEAR : I SEM / I YEAR
COURSE CODE : 21AU0004
TITLE OF THE COURSE : CONSTITUTION OF INDIA & PROFESSIONAL ETHICS
L: T: P: S/P : C : 2 : 0 : 0 : 0 : 1

Course objectives

1. To provide basic information about Indian constitution.
2. To identify individual role and ethical responsibility towards society.

Course outcomes

At the end of the course student will be able

- Understand state and central policies, fundamental duties
- Understand Electoral Process, special provisions
- Understand powers and functions of Muncipalities, Panchayats and Cooperative Societies,
- Understand Engineering ethics and responsibilities of Engineers

Introduction to the Constitution of India, The Making of the Constitution and Sailent features of the Constitution. Preamble to the Indian Constitution Fundamental Rights & its limitations.
Directive Principles of State Policy & Relevance of Directive Principles State Policy fundamental Duties.
Union Executives – President, Prime Minister Parliament Supreme Court of India. State Executives – Governor Chief Minister, State Legislature High Court of State.

Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th&91st Amendments.

Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions.

Powers and functions of Municipalities, Panchyats and Co – Operative Societies.

Text Books:

1. Brij Kishore Sharma,"Introduction to the Constitution of India", PHI Learning Pvt. Ltd., New Delhi, 2011.
2. Durga Das Basu: "Introduction to the Constitution on India", (Students Edn.) PrenticeHall, 19th / 20th Edn., 2001

Reference Books:

1. M.V.Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.

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SEMESTER/YEAR : II SEM / I YEAR
COURSE CODE : 21AU0008
TITLE OF THE COURSE : ENVIRONMENT AND PUBLIC HEALTH
L: T/A: P: C : 2: 0: 0: 1

MODULE 1

Linkages between Environment and Health: Understanding linkages between Environment and Public Health: Effect of quality of air, water and soil on health. Perspective on Individual health: Nutritional, socio-cultural and developmental aspects, Dietary diversity for good health; Human developmental indices for public health

MODULE 2

Climate Change and Implications on Public Health: Global warming - Agricultural practices (chemical agriculture) and Industrial technologies (use of non-biodegradable materials like plastics, aerosols, refrigerants, pesticides); Manifestations of Climate change on Public Health- Burning of Fossil fuels , automobile emissions and Acid rain.

MODULE 3

Diseases in Contemporary Society Definition- need for good health- factors affecting health. Types of diseases - deficiency, infection, pollution diseases- allergies, respiratory, cardiovascular, and cancer Personal hygiene- food - balanced diet. Food habits and cleanliness, food adulterants, avoiding smoking, drugs and alcohol. Communicable diseases: Mode of transmission -epidemic and endemic diseases. Management of hygiene in public places - Railway stations, Bus stands and other public places. Infectious diseases: Role of sanitation and poverty case studies on TB, diarrhea, malaria, viral diseases .Non-communicable diseases: Role of Lifestyle and built environment. Diabetes and Hypertension.

MODULE 4

Perspectives and Interventions in Public Health Epidemiological perspectives — Disease burden and surveillance; Alternative systems of medicine - Ayurveda, Yoga, Unani, Siddha and Homeopathy (AYUSH); Universal Immunization Programme (UIP); Reproductive health-Youth Unite for Victory on AIDS (YUVA) programme of Government of India. Occupational health hazards-physical-chemical and biological. Occupational diseases- prevention and control.

MODULE 5

Environmental Management Policies and Practices Municipal solid waste management: Definition, sources, characterization collection and transportation and disposal methods. Solid waste management system in urban and rural areas. Municipal Solid waste rules.

Policies and practices with respect to Environmental Protection Act, Forest Conservation Act, Wild life protection Act, Water and Air Act, Industrial, Biomedical and E waste disposal rules.

MODULE 6

Assignment /Field Work (from the list)

- Examining local cuisines for dietary diversity.

- Examining National Health Survey data e.g. National Family Health Survey, Annual Health surveys.
- Survey of Immunization coverage in a particular area.
- To establish if there is a relation between GDP and life expectancies/Health parameters.
- Survey of Respiratory allergies.
- Examining household/institutional/market/neighborhood wastes and their disposal mechanism.
- Survey of households along the Arkavathi and Cauvery River for life expectancy and common ailments and diseases.
- Determine the extent of use of paper and suggest means of reducing the use of paper and paper products.
- Documentation of festival/fasting and mapping of agro-ecological cycles.
- Definitions of poverty - Governmental policies on poverty mitigation - facts and fiction.
- Health indicators vis- a-vis income groups.
- Deforestation and flooding - myth or fact?
- Smoking and Lung Cancer
- Estimation of water-demands of a city/town.
- Adapting water-harvesting technology - survey, sustainability.
- Quantitative relation between bio-resource and consumer products - bathing soap, paper, furniture & construction as related to trees.
- Differential access to water - demand and actual access.
- Transport losses in water supply.
- Storage losses in food grain.
- Study of sewage treatment plants.
- Social perspective - child-health and small scale industries.
- Document infant immunization.
- Studying effective programme implementation - Reproductive health.
- Opportunities of physical activities in neighborhood - Study of built environment - Land- use pattern in Urban Settlements.
- Air quality in Delhi.
- Changing transport means in Delhi - CNG.
- Rituals and environmental pollution e.g. water, noise, air.
- Dialogue with doctors and paramedics.
- Methods of consultation of doctors.
- Population pressure/growth and resource degradation.
- Nutritional disorders/deficiencies in different populations groups-surveys.
- Compose and enact street plays. Create posters/ audio-video materials/ greeting cards highlighting environmental issues.
- Collecting information on medicinal plants.
- Collecting information from elders and other prominent persons.
- Occupational hazards and health issues.
- Water-borne diseases - exacerbation by irrigation projects.
- Alternate medicines - use of therapies for different diseases categories.

- Lifestyle diseases.
- Pollutants in air/water/soil and their effect on health.
- FDI in specific manufacturing Industries and local health problems.
- Differential pricing policy of petroleum products and environmental pollution - case studies.
- Wildlife Protection Act - case studies.
- Bhopal Gas Tragedy- Science, Laws and Public Health
- Changing Human Development Indices over time – in India/other countries.
- Supply, demand and gap filling –role of ground water.

REFERENCES:

1. Indian Academy of Paediatrics. (2011). Guidebook on Immunization. mfc bulletin, 45- 50.
2. Nandini N, Sunitha N. and Sucharita Tandon, (2007), Environmental Studies, Sapna Book House, Bangalore
3. Michel, Mckinney, Robert and Logan (2007). Environmental Science – Systems & Solutions. Jones & Barlett Publishers, Canada.
4. Minkoff, E., & Baker, P. (2003). Biology Today: An Issues Approach (3 ed.).
5. Park, K. (2011). Preventive and Social Medicine. Benarsi Das Publications, (pp. 16- 19,24-27).
6. Public Health Nutrition in Developing Countries Part-2). Wood head Publishing India.
7. Sadgopal, M., & Sagar, A. (2007, July-September). Can Public Health open up to the AYUSH Systems and give space for People's views of health and disease?.
8. Sekhsaria, P. (2007). Conservation in India and the Need to Think Beyond 'Tiger vs. Tribal'. Biotropica, 39(5), 575-577.
9. Tyler Miller and Scott E. Spoolman 'Environmental Science' (2012) 13th edition First Indian Reprint Chapters 14-17
10. UNDP. (2013). The Human Development Report, The Rise of the South: Human Progress in Diverse World. New York: UNDP, (also available in Hindi),
11. Wani, M., & Kothari, A. (2007, July 15). Protected areas and human rights India: the impact of the official conservation model on local communities. Policy Matters, 100- 114.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : III SEM /II YEAR
COURSE CODE : 21CA2301
TITLE OF THE COURSE : COMPUTER NETWORKS
L: T: P: S/P: C : 03-00-00-02-04

Course Objectives

The objectives of the Course are:

- Understand the division of network functionalities into layers.
- Be familiar with the components required to build different types of networks
- Be exposed to the required functionality at each layer
- Learn the flow control and congestion control algorithms

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonon Level**
CO1	Identify the components required to build different types of networks	1- Remember
CO2	Choose the required functionality at each layer for given application	2-Understand
CO3	Identify solution for each functionality at each layer	6- Create
CO4	Trace the flow of information from one node to another node in the network	3-Apply
CO5	Outline concepts of Routing	2-Understand

MODUIE:1 INTRODUCTION

Building a network – network edge and core – layering and protocols - - OSI Reference Model - Network Topologies – Internet Architecture - networking devices – modems, routers, switches, gateways. **Data Communication:** Signal characteristics – Data transmission – Physical links and transmission media – Signal encoding techniques - Channel access techniques – TDM – FDM.

DATA LINK LAYER AND LAN:

Link layer services – Framing - Error control – flow control – media access control - Ethernet – CSMA/CD – Token Ring - FDDI - Wireless LANs – CSMA/CA.

NETWORK AND ROUTING:

Circuit switching – packet switching – virtual circuit switching - Routing - IP – Global Address – Datagram Forwarding – Subnetting – CIDR - ARP – DHCP – RIP – OSPF - BGP - ICMP – IPv6.

TRANSPORT LAYER:

Overview of Transport layer – UDP - TCP – Reliable byte stream – connection management – flow control – retransmission - Congestion control - congestion avoidance.

APPLICATION LAyER:
Needs/Principles of Application layer Protocols – Web and HTTP – FTP – Electronic Mail (SMTP, POP3, IMAP, and MIME) – DNS – SNMP

Text Book:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A systems approach",Morgan Kaufmann Publishers, USA, 2010.
2. James F. Kurose, Keith W. Ross,"Computer Networking – A Top-Down Approach Featuring the Internet", Pearson Education, New Delhi, 2009.

References:

1. Prakash C Gupta," Data Communication and Computer Networks", Prentice Hall of India, New Delhi, 2009.
2. Achyut S Godbole, "Data Communication and Networking", Tata McGraw Hill Publishing Company, New Delhi, 2007.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, "Computer Networks An Open Source Approach ", McGraw Hill Publisher, USA, 2011.
4. Andrew S Tanenbaum, David J. Wetherill "Computer Networks", Prentice Hall of India/ Pearson Education, New Delhi, 2010.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : III SEM /II YEAR
COURSE CODE : 21CA2302
TITLE OF THE COURSE : Human Computer Interface
L: T: P: S/P: C : 03-00-00-02-04

Course Objectives

The objectives of the Course are:

- Learn the foundations of Human Computer Interface
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile HCI
- Learn the guidelines for user interface.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Design effective dialog for HCI	1- Remember
CO2	Design effective HCI for individuals and persons with disabilities.	2-Understand
CO3	Assess the importance of user feedback.	6- Create
CO4	Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites	3-Apply
CO5	Develop meaningful user interface.	2-Understand

Course Aim and Summary

The course '**HUMAN COMPUTER INTERFACE**' aims at introducing. The course deals with design and software process of HCI. The course emphasizes on improving mobile application information. During the course, the students will be taught about design and tools of mobile and software process.

Course Content

Module 1: FOUNDATIONS OF HCI

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

Module 2: DESIGN & SOFTWARE PROCESS

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

Module 3: MODELS AND THEORIES

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

Module 4: MOBILE HCI

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Module 5: WEB INTERFACE DESIGN:

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

Text Book:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I, II & III)
2. Brian Fling, "Mobile Design and Development", First Edition, O'Reilly Media Inc., 2009 (UNIT –IV) 3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O'Reilly, 2009. (UNIT-V)

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : III SEM /II YEAR

COURSE CODE : 21CA2303
TITLE OF THE COURSE : Software Engineering
L: T: P: S/P: C : 03-00-02-00-04

Course Objectives

The objectives of the Course are:

- Understand the phases in a software project
- Understand fundamental concepts of requirements engineering and Analysis Modeling.
- Understand the major considerations for enterprise integration and deployment. ☐ Learn various testing and maintenance measures

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Identify the key activities in managing a software project.	1- Remember
CO2	Compare different process models	2- Understand
CO3	Concepts of requirements engineering and Analysis Modeling	6- Create
CO4	Apply systematic procedure for software design and deployment.	3-Apply
CO5	Concepts of configure management and maintenance	2- Understand

Course Aim and Summary

The course '**Software Engineering**' aims at introducing the different phases of software project. The course deals with fundamental concept of requirement and analysis modeling. The course emphasizes on improving the software management.

Module 1: SOFTWARE PROCESS

Definition of terms - The evolving role of Software – Software characteristics - Software applications - Software Myths.

Software Process: Software process models - The linear sequential model - The prototyping model - The RAD model - Evolutionary software process models - The incremental model - The spiral model - Fourth generation techniques- Agile process.

Module 2: SYSTEM ENGINEERING

Requirements elicitation - Requirements analysis and negotiation - Requirements validation - Requirements management – Joint Application Development – case study.

Module 3: ANALYSIS MODELING:

The elements of the analysis model - Data modeling - Data objects, attributes and relationships - Cardinality and modality - Entity/Relationship diagram - Data flow diagrams - The data dictionary - Other classical analysis methods – case study.

Module 4: DESIGN CONCEPTS AND PRINCIPLES:

Modularity - Functional Independence - Cohesion-Coupling - Design documentation. Software architecture - Architectural design - Transform centered architecture - Transaction centered architecture – case study.

Module 5: SOFTWARE METRICS:

Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Cost Estimation - Reliability – Software Quality Assurance – Standards – Case Study for COCOMO model.

Text Book:

1. Roger S Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill International edition, Seventh edition, 2009.
2. Ian Sommerville, Software Engineering, 8th Edition, Pearson Education, 2008.

References:

1. Stephan Schach, Software Engineering, Tata McGraw Hill, 2007
2. Pledgers and Lawrence Software Engineering: Theory and Practice, Pearson Education, Second edition, 2001

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : III SEM /II YEAR
COURSE CODE : 21CA2304
TITLE OF THE COURSE : Numerical Methods
L: T: P: S/P: C : 03-00-02-00-04

Course Objectives

The objectives of the Course are:

- The Curriculum supports the prerequisites to enhance their Mathematical Knowledge.
- To understand mathematical and numerical concepts.
- To persuade research work in concerned fields with the help of mathematical approach

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Understand and use Eigen values, interpolation and approximation in problem solving	1- Remember
CO2	Use suitable numerical differentiation and integration model for the given scenario/system	2- Understand
CO3	To acquaint the student with understanding of numerical techniques of differentiation	6- Create
CO4	To acquaint the knowledge of various techniques and methods of solving ordinary differential	3-Apply
CO5	To understand the knowledge of various techniques and methods of solving various types of partial differential equations	2- Understand

Course Aim and Summary

The course '**Numerical Methods**' aims at introducing numerical methods and mathematical modeling on problem solving.

Module 1: Mathematical Modeling, Numerical Methods and Problem Solving

A Simple Mathematical Model- Conservation Laws in Engineering and Science- MATLAB Fundamentals. Roots and Optimization-Roots: Bracketing Methods - Open Methods

Module 2: Linear Systems

Gauss Elimination - *LU* Factorization- Matrix Inverse and Condition- Iterative Methods.

Module 3: Curve Fitting

Linear Regression- General Linear Least-Squares and Nonlinear Regression- Fourier analysis.

Module 4: Numerical Differentiation and Integration

Numerical Integration Formulas - Numerical Integration of Functions- Numerical Differentiation.

Module 5: Ordinary Differential Equations

Initial-Value Problems - Adaptive Methods and Stiff Systems - Boundary-Value Problems.

Text Book:

1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003
3. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.
4. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : III SEM /II YEAR
COURSE CODE : 21CA2305
TITLE OF THE COURSE : Analysis and Design of Algorithms
L: T: P: S/P: C : 03-00-00-00-03

Course Objectives

The objectives of the Course are:

- Learn the algorithm analysis techniques.
- Become familiar with the different algorithm design techniques.
- Understand the limitations of Algorithm power.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	derstand the various methods for analysis of algorithms.	1-Remember
CO2	Design algorithms for various computing problems	2-Understand
CO3	Analyse the time and space complexity of algorithms	6- Create
CO4	Critically analyse the different algorithm design techniques for a given problem	3-Apply
CO5	Modify existing algorithms to improve efficiency	2-Understand

Course Aim and Summary

The course '**Analysis and Design of Algorithms'** aims at introducing algorithm analysis techniques. The course deals with different algorithm design and its limitations

Module 1: INTRODUCTION

Definition and properties of algorithms- Recurrence and Non Recurrence algorithm - Analysis of algorithms- Asymptotic notations- Solving recurrence relations- Complexity analysis of Insertion sort, Radix sort, Linear search, finding factorial, binary search - Introduction to NP-Hard and NP-Completeness.

Module 2: DIVIDE-AND-CONQUER AND GREEDY METHOD

The general method- Finding Maximum and Minimum Element-Quick sort – Merge sort- Matrix multiplication

Greedy Method

The general method- Optimal storage on tapes- Knapsack problem- Minimum spanning trees- Single source shortest path method..

Module 3: DYNAMIC PROGRAMMING:
The General method- All pairs shortest path- Optimal binary Search tree- Multistage graphs.

Module 4: BACKTRACKING:
The General method- Solution space and tree organization- The Eight Queens problem - Sum of subset problem - Graph coloring - Knapsack problem.

Module 5: BRANCH AND BOUND:
The General method- LC search – LC branch and Bound – FIFO branch and bound- 0/1 Knapsack problem- Traveling sales person problem- Efficiency consideration.

Text Book:

1. Thomas H.Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, "Introduction to Algorithms", MIT Press, England, 2009.

References:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Golgotha Publications, New Delhi, 2010.
2. Anany V Levitin, "Introduction to the Design & Analysis of Algorithms", Prentice Hall of India /Pearson Education, New Delhi, 2008.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : III SEM /II YEAR
COURSE CODE : 21CA2306
TITLE OF THE COURSE : Operating System
L: T: P: S/P: C : 03-00-00-00-03

Course Objectives

The objectives of the Course are:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Design various Scheduling algorithms	1- Remember
CO2	Design deadlock, prevention and avoidance algorithms.	2- Understand
CO3	Compare and contrast various memory management schemes	6- Create
CO4	Understand the storage management and file structures	3-Apply
CO5	derstand the functions of operating system.	2- Understand

Course Aim and Summary

The course '**Operating System'** aims at introducing concepts and functions of operating systems. The course emphasizes on improving the knowledge on scheduling algorithms and memory management.

Module 1: INTRODUCTION AND SYSTEMS STRUCTURE

Operating system as an extended machine, resource manager. History of OS – first, second, third, fourth, present. Basic operating system concepts – processes, files, shell.

Operating Systems Structures: operating system services, user operating system interface, system calls and its types, is design and implementation, virtual machines, debugging, system boot.

Module 2: PROCESS

Process model – creation, termination, hierarchies, states, implementation. Process synchronization – race conditions, critical sections, mutual exclusion, Peterson's solution, synchronization hardware, semaphores, mutex, monitor, message passing, atomic transactions

Module 3: THREADS AND SCHEDULING:
Multithreading models, thread libraries, threading issues, threading in java, classic synchronization problems – dining philosophers and readers writers' problems and its programming solutions.
Scheduling: Batch systems, interactive systems, real time systems, threads. Scheduling criteria, scheduling algorithms, thread and multiprocessor scheduling algorithms, examples and algorithms evaluation.

Module 4: DEADLOCKS MEMORY MANAGEMENT:
Resources, Principles of deadlock, methods for handling deadlock – ostrich and bankers algorithm, detection and recovery, deadlock prevention, deadlock avoidance.
Memory Management**:** Main memory – swapping, contiguous memory allocation, paging, structure of page table, segmentation, examples. Virtual memory – demand paging, copy on write, page replacement, allocation of frames, thrashing, memory mapped files, allocating kernel memory, memory management utilities

Module 5: VIRTUALIZATION
Requirements - Type 1 Hypervisors - Type 2 Hypervisors – Para virtualization - Memory Virtualization - I/O Virtualization - Virtual Appliances - Virtual Machines on Multicore CPUs - Licensing Issues (3)
CASE STUDY: Windows

Text Book:

1. Silberschatz A, Galvin P and Gagne G "Operating Systems Concepts", John Wiley & Sons, USA, 2008.
2. Andrew S Tanenbaum, "Operating Systems Design and Implementation", Prentice Hall of India, New Delhi, 2006.

References:

1. Deitel H M, Deitel J P, David R Choffnes, " Operating Systems", Prentice Hall of India, New Delhi, 2004.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, New Delhi, 2008
3. Mark Russinovich, David A. Solomon, Alex Ionesco, "Windows Internals: Including Windows Server 2008 and Windows Vista", Microsoft Press, Cambridge, England, 2009. 4. Gary Nutt, "Operating Systems", Addison Wesley, USA, 2004.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : IVSEM /II YEAR
COURSE CODE : 21CA2401
TITLE OF THE COURSE : Object Oriented Analysis and Design
L: T: P: S/P: C : 03-00-02-00-04

Course Objectives

The objectives of the Course are:

- Learn the basics of OO analysis and design skills
- Learn the UML design diagrams
- Learn to map design to code
- Be exposed to the various testing techniques.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Design and implement projects using OO concepts	1-Remember
CO2	Use the UML analysis and design diagrams	2-Understand
CO3	Apply appropriate design patterns	6- Create
CO4	To outline and analyze the areas of design pattern correspondence with code.	3-Apply
CO5	explain the purpose of applying particular design pattern to a specific module.	2-Understand

Course Aim and Summary

The course '**Object Oriented Analysis and Design Using Agile Approach'** aims at introducing the basics of object oriented analysis and design skills. The course deals with methodologies and modeling of object oriented design. During the course, the students will be taught UML analysis and its design patterns.

Module 1: INTRODUCTION

Complexity- Structure of complex of systems, Inherent complexity of software, attributes of a complex system, Evolution of object models – Foundations of Object model, Elements of Object model – Major elements: Abstraction, Encapsulation, Modularity and Hierarchy- Minor elements Typing, Concurrency, Persistence.

Module 2: CLASSES AND OBJECTS

Nature of an object- Relationships among objects – Nature of class – Relationship among classes – Interplay of Classes and objects- on building quality classes and objects Classification: Importance of Proper Classification- Identifying classes and objects –Key Abstractions and Mechanisms.

Module 3: METHODOLOGY AND MODELING

Object oriented methodologies - Introduction, Survey of some Object oriented methodologies – Rumbaugh, Brooch, Jacobson, Patterns, Frameworks, Unified approach.

Module 4: UNIFIED MODELING LANGUAGE

CLASS DIAGRAM: Notation- Object diagram, Class interface notation.

UML Interaction DIAGRAMS: Sequence Diagrams, Collaboration Diagrams- UML State chart diagram, UML Activity diagram, Implementation diagrams: Component diagram, Deployment diagram.

Module 5: CASE STUDIES

Object Oriented Analysis process, Object oriented Design process **-** Automatic Teller Machine

Text Book:

1. Grady Brooch, Robert A.Maksimchuk, Michael. W. Engle, Bobbi J. Young, JIM Conallen, Kelli A. Houston "Object Oriented Analysis and Design with Applications", Pearson Education Inc., USA, 2010
2. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, Singapore, 2008.

References:

1. Rumbaugh J, Blaha M, Premerlani W, Eddy F and Lorensen W, "Object Oriented Modeling and Design", Prentice Hall of India/ Pearson Education, New Delhi, 2004.
2. Kendall Scott, martin Fowler, "UML Distilled : A brief guide to the standard Object modeling Language ", Addison Wesley, USA, 2009
3. Atul Kahate, "Objetct Oriented Analysis and Design ", Tata McGraw-Hill, New Delhi 2007. 4. Sudha Sadasivam G., "Object-Oriented Analysis and Design", Macmillan India, New Delhi, 2009.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : IVSEM /II YEAR
COURSE CODE : 21CA2402
TITLE OF THE COURSE : Web Technology
L: T: P: S/P: C : 03-00-00-00-03

Course Objectives

The objectives of the Course are:

- Describe several tools and/or techniques involved in developing professional-level Web sites.
- Compare and contrast those tools and/or techniques while analyzing their appropriateness for solving specific problems.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Demonstrate an understanding of the basic principles of the programming process	1- Remember
CO2	Demonstrate an understanding of the web and related delivery systems.	2-Understand
CO3	Basics of client-side scripting language	6- Create
CO4	To understand concepts of XML	3-Apply
CO5	Knowledge on E-Business and its functions	2-Understand

Course Aim and Summary

The course '**Advanced Web Programming'** aims at introducing computer programming in the C language. The course deals with language fundamentals, control flow statements, decision-making statements, loops, and derived data types like arrays, strings, functions, pointers, structures, and unions. The course emphasizes improving the problem-solving capabilities of students using computers. During the course, the students will be taught to design algorithms, implement and execute problems in the form of C programs.

Module 1: ADVANCED HTML

Working with images, links, and lists, creating tables. working with frames, creating horizontal, vertical frames, named frames, opening a new browser window, creating HTML forms, Adding controls on forms, submitting data from forms, working with multimedia, multimedia sound, video, 3D, Using multimedia files, inline sound, and videos. Style sheets: types, creating, and, using style sheets.

Module 2: CSS & JavaScript

Introduction to the client and server-side scripting, introduction to Cascading Style sheet, selectors and their properties, where to include CSS in HTML. Introduction to JavaScript, data types, operators, conditional statements, loops in JavaScript, functions, arrays, objects, and elements in JavaScript, form validation using JavaScript.

Module 3: XML

Introduction to XML, Creating XML documents, specifying attributes in DTDs, accessing XML data with XML Data Island, documents. Handling events while loading XML documents.

Module 4: Introduction to query

Introducing jQuery, jQuery fundamentals, Creating the wrapped element set: Selecting elements for manipulation, Bringing pages to life with jQuery: Manipulating element properties and attributes. Changing element styling, Setting element content, Understanding the browser event model

Module 5: E-Commerce:

Introduction to E-Business, Electronic Fund Transfer (EFT), Value chain, internet Business strategy, Functional Architecture, implementation Strategies; Building Blocks of E-commerce, System design, creating and managing content, etc.; Payment systems; Auxiliary system; transaction Processing; Building ecommerce system, system architecture, secure links, etc.; Present and Future Trend; Impact of e-commerce; A case study on the development of e-commerce system

Text Book:

1. Robert W. Sebesta, Programming the World Wide Web,7th Edition, Pearson Education, 2008.
2. Bayross, Web Enable Commercial Application Development Using HTML, DHTML, JavaScript, Pen CGI, BPB Publications, 2000
3. J. Jaworski, Mastering JavaScript, BPB Publications, 1999
4. Bear bibeault, Yehuda Katz: jQuery in Action. 3rd Edn, DreamTech India,200

References:

. A. Powell, Complete Reference HTML (Third Edition), TMH, 2002 2.

uczek, ASP.NET Developers Guide, TMH, 2002

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : IV SEM /II YEAR
COURSE CODE : 21CA2403
TITLE OF THE COURSE : Database System
L: T: P: S/P: C : 03-00-00-00-03

Course Objectives

The objectives of the Course are:

- To expose the students to the fundamentals of Database Management Systems.
- To make the students understand the relational model.
- To familiarize the students with ER diagrams.
- To expose the students to SQL.
- To make the students to understand the fundamentals of Transaction Processing and Query Processing.
- To familiarize the students with the different types of databases.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Design Databases for applications	1- Remember
CO2	Use the Relational model, ER diagrams	2-Understand
CO3	Apply concurrency control and recovery mechanisms for practical problems	6- Create
CO4	Design the Query Processor and Transaction Processor	3-Apply
CO5	Discuss the concepts of index structure and files	2-Understand

Course Aim and Summary

The course '**Database System'** aims at introducing fundamentals of Database Systems. The course deals with language fundamentals of Transaction Processing and Query Processing. During the course, the students will be taught about relational model, ER diagrams and SQL

Module 1: INTRODUCTION

Data, Database, Database management system, Characteristics of the database approach, Role of Database administrators, Role of Database Designers, End Users, Advantages of Using a DBMS and When not to use a DBMS.

Module 2: DBMS Architecture:

Data Models – Categories of data models, Schemas, Instances, and Database state. DBMS Architecture and Data Independence – The Three schema architecture, Data independence. DBMS Languages and Interfaces. Classifications of Database Management Systems

Module 3: Data Modeling Using Entity

Relationship Model: Using High Level Conceptual Data Models for Database Design, Example Database applications. Entity types, Entity Sets, Attributes and Keys. Relationships, Relationship types, Roles and Structural constraints. Weak Entity Types and Drawing E- R Diagrams..

Module 4: Index Structures for Files

Single Level Ordered Indexes – Primary indexes, clustering indexes and Secondary indexes. Multi-level indexes, Dynamic Multilevel indexes using B-trees (Introductory concepts). Hashing concepts.

Module 5: Relational Data Model

Relation, Integrity constraints - domain, entity and Referential integrity constraints, Basic Relational Algebra operations, select, project and join operations. Functional dependencies and Normalization for Relational Databases, Normalization concepts, first, second, third normal forms, Boyce-Cods normal form. **SQL:** Queries, sub queries, correlated sub query, views, updating of a database through views, Update, Delete.

Text Book:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2010
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson/ Admission Wesley, 2010.

References:

1. O`neil Patric & O`neil Elizabeth, Database Principles, Programming and Performance, 2nd Edition, Margon Kaufmann Publishers Inc.
2. Bipin Desai, “An Introduction to database systems”, Galgotia Publications, 1991.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : IV SEM /II YEAR
COURSE CODE : 21CA2404
TITLE OF THE COURSE : Software Testing
L: T: P: S/P: C : 03-00-02-00-04

Course Objectives

The objectives of the Course are:

- Expose the criteria for test cases.
- Learn the design of test cases.
- Be familiar with test management and test automation techniques.
- Be exposed to test metrics and measurements.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Design test cases suitable for a software development for different domains	1- Remember
CO2	Identify suitable tests to be carried out	2- Understand
CO3	Prepare test planning based on the document	6- Create
CO4	Document test plans and test cases designed	3-Apply
CO5	Develop and validate a test plan	2- Understand

Course Aim and Summary

The course '**Software Testing'** aims at introducing different test cases and design of it. The course deals with language test management and its techniques.

Module 1: Introduction to Software Quality Engineering

Software Quality -Software Quality Assurance -Reviews, Inspections and Walkthroughs.

Module 2: Introduction to Testing

Guiding Principles of testing – Composition of a testing team – Essential Skills of a tester – Types of Testing – Evaluating the quality of test cases – Techniques for reducing number of test cases- Requirements for effective testing – Test Oracle – Economics of testing – Handling Defects

Module 3: White Box (Structural) Testing

Introduction to control paths – Control flow Testing – Basis Path testing – Linear Code Sequence and Jump Coverage – Looping testing – Data Flow Testing – Slice-based Testing – Pitfalls of White box testing – Tools for White box testing.

Module 4: Integration Testing

Types of integration testing – Functional Testing – Non- Functional Testing – Acceptance Testing- Regression Testing.

Module 5: TEST Management

Activities in test management – Evaluation of test Effectiveness – Release management – Tools in test management. Cloud Testing – Test Automation.

Text Book and References Text Book:

1. Anirban Basu, "Software Quality Assurance, Testing and Metrics ", PHI.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : IVSEM /II YEAR
COURSE CODE : 21CA2408
TITLE OF THE COURSE : System Administration
L: T: P: S/P: C : 02-01-00-02-04

Course Objectives

The objectives of the Course are:

- This course focuses on administration of operating systems in a client-server Technology.
- Installation and maintenance. It prepares students to installation of Windows Server; NTFS file system and folder permissions, Domain Name System, Active Directory, local and domain Group Policy, Windows Terminal Services.
- Internet Security and Acceleration Server, Internet Information Services, communications and networking.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	students will have a basic knowledge about the installation and configuration of the server operating systems	1- Remember
CO2	To understand working of operating system	2- Understand
CO3	To understand disk management	6- Create
CO4	At the end to do any application installation and maintenance	3-Apply
CO5	To learn security techniques and backup methods	2- Understand

Course Aim and Summary

The course '**System Administration'** aims at introducing administration of operating systems in a clientserver technology. It prepares students to installation of Windows Server; NTFS file system and folder permissions. During the course, the students will be able to resolve internet security application installation issues.

Module 1: INTRODUCTION TO SYSTEM ADMINISTRATION:

Why System Administration is required in our system? Role and responsibilities of System Administrator. Basics and background of Windows and Unix/Linux OS. Basic Info and Account Management. File and directory layout. File Systems (NTFS, FAT, UFS). File permissions. ACL

Module 2: INSTALLATION AND WORKING OF THE OPERATING SYSTEM:

Basic DOS/Windows/Unix commands and tools. Command Line vs. GUI. Start up (booting) and Shutdown. Task Manager. More Account Management. System Processes. Scheduling jobs (scheduler/cron), job monitoring. (event viewer/ps), start and stop jobs. At command vs. Scheduled Tasks GUI tool.

Module 3: DISK ADMINISTRATION:

Disk administration - File systems/partitions. Disk Defragmentation. RAID. Basic client/server file sharing. Files, Directories and Memory Management. Permissions.

Module 4: NETWORKING

TCP/IP, DNS, DHCP, Domains/NIS. File Sharing. Client/Server. NFS. NetBeui. PDC/BDC. Active Directory. Setting up a file server (and client/server network).Ethernet Addresses, Hostnames. Automating System Admin Tasks. Scripts. Regedit.(shell, perl and C) Performance Monitoring and Optimization.

Module 5: SECURITY AND BACKUPS

Patches, passwords, kerberos, enigma... Tools (tcpwrappers and others). Backup methods.
Other Advanced Topics (depending upon time), printing, Installing / upgrading hardware/software/O.S.email server, web server, dns/dhcp server, telnet/ftp/ssh , unix-windows interoperability (samba), user communications and documentation problems resolution and solutions, raid, san, nas.

Text Book:

1. Hassell J., Learning Windows Server 2003, O'Reilly Media, 2004.
2. Hassell J., Windows Server 2008: the definitive guide, O'Reilly Media, 2008

References

1. Von Hagen W., Ubuntu Linux Bible: Featuring Ubuntu 10.04 LTS, John Wiley & Sons, 2010.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : IV SEM /II YEAR
COURSE CODE : 21CA2409
TITLE OF THE COURSE : IOT
L: T: P: S/P: C : 02-01-00-02-04

Course Objectives

The objectives of the Course are:

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Analyze various protocols for IoT	1- Remember
CO2	Develop web services to access/control IoT devices.	2-Understand
CO3	Design a portable IoT using Rasperry Pi	6- Create
CO4	Deploy an IoT application and connect to the cloud.	3-Apply
CO5	Analyze applications of IoT in real time scenario	2-Understand

Course Aim and Summary

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Module 1: Introduction to IoT (9)

Introduction: Definition, Characteristics of IoT, IoT Conceptual framework, Physical design of IoT, Logical design of IoT, Application of IoT, IoT and M2M, IoT System Management with NETCONF-YANG

Module 2: Design Principles for Web Connectivity

Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful, and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet-based communication, IP addressing in IoT, Media Access control.

Module 3: Sensor Technology

Sensor Technology, Participatory Sensing, Actuator, Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Network Technology.

Module 4: IoT Design methodology

IoT Design methodology: Specification -Requirement, process, model, service, functional & operational view. IoT Device -Building blocks, Raspberry Pi, Arduino devices, NodeMCU, Programming with Arduino and Raspberry.

Module 5: Case Studies and Real-World Applications

Real-world design constraints, Home automation, Industrial Automation, Smart grid, Smart Agriculture, IoMT, Commercial building automation, Smart cities, Data Analytics for IoT, Cloud Storage Models & Communication APIs, Cloud for IoT, Amazon Web Services for IoT.

Text Book

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication

2. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)" 1st Edition ,Universal Press

3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication. **References**

1. Charless Bell "MySQL for the Internet of things", Apress publications.

2. Francis dacosta "Rethinking the Internet of things: A scalable approach to connecting everything", 1st edition, Apress publications 2013.

3. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication.

DAYANANDA SAGAR UNIVERSITY

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Department of Computer Applications

SEMESTER/YEAR	**: IV SEM /II YEAR**
COURSE CODE	**: 21CA2410**
TITLE OF THE COURSE	**: Unix Internals**
L:T:P:S/P:C	**:02-01-00-02-04**

Course Objectives

The objectives of the Course are:

- To be able to read and understand sample open source programs and header files.
- To learn how the processes are implemented in Unix.
- To understand the implementation of the Unix file system.
- To study Linux memory management data structures and algorithms.
- To acquire the knowledge in the implementation of interprocess communication.
- To understand how program execution happens in Linux.

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	scuss the various synchronization, scheduling and memory management issues.	1- Remember
CO2	Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system	2- Understand
CO3	Discuss the various resource management techniques for distributed systems	6- Create
CO4	Identify the different features of real time and mobile operating systems	3-Apply
CO5	Modify existing open source kernels in terms of functionality or features used	1- Remember

Course Aim and Summary

To provide knowledge about Unix operating system working principles, its file system and programming for interprocess communication. It also gives an understanding for using various system calls.

Module 1

General Review of the System-History-System structure-User Perspective-Operating System Services- Assumptions About Hardware. Introduction to the Kernel-Architecture System Concepts-Data Structures- System Administration.

Module 2

The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks - Advantages and Disadvantages. Internal Representation of Files-Inodes- Structure-Directories-Path Name to Inode- Super Block-Inode Assignment-Allocation of Disk Blocks - Other File Types.

Module 3

System Calls for the File System-Open-Read-Write-Lseek-Close-Create-Special files Creation -Change Directory and Change Root-Change Owner and Change Mode-Stat-FstatPipes-Dup-Mount-Unmount-Link-Unlink-File System Abstraction-Maintenance.

Module 4

The System Representation of Processes-States-Transitions-System Memory-Context of a Process-Saving the Context-Manipulation of a Process Address Space-Sleep Process Control-signals-Process Termination-Awaiting-Invoking other Programs-The Shell-System Boot and the INIT Process.

Module 5

Memory Management Policies-Swapping-Demand Paging- a Hybrid System-I/O Subsystem - Driver Interfaces - Disk Drivers -Terminal Drivers.

TEXT BOOK:

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education, 2002.

REFERENCES:

1. Uresh Vahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000. 2. John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications, 2004.
3. Daniel P. Bovet & Marco Cesati, “Understanding the Linux Kernel”, O’REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000.
4. M. Beck et al, “Linux Kernel Programming”, Pearson Education Asia, 2002

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : IVSEM /II YEAR
COURSE CODE : 21CA2411
TITLE OF THE COURSE : Internet and Web Architecture
L:T:P:S/P:C : 02-01-00-02-04

Course Objectives

The objectives of the Course are:

- To understand the client / server programming
- To learn CSS to implement a variety of presentation effects using HTML and XML documents.
- To know the unique features of scripting languages

Course Outcomes

After undergoing this course, students will be able to:

	Outcomes	**Bloom's Taxonomy Level**
CO1	Upon Completion of the course, the students should be able to client / server programming	1- Remember
CO2	Create web pages using HTML, JavaScript and CSS	2-Understand
CO3	Understand the key technologies of Internet	6- Create
CO4	Distinguish the concepts of Java script and Java servlet	3-Apply
CO5	Understand the web service technologies	2-Understand

Course Aim and Summary

The course '**Internet and Web Architecture'** aims at introducing client side and server side programming. The course deals with basic knowledge on JSP programming with its classes and library files.

Module 1: Web Essentials

Internet – Web clients – Web servers – Markup languages – XHTML 1.0 – Cascading Style Sheets (CSS): Features- Style rule cascading and inheritance - Text properties –CSS box model.

Module 2: Client Side Programming

Java script operators - Java script objects – Arrays – Build-in objects - DOM: History and levels- Document tree- DOM event handling- Non compliant browsers-Angular JS

Module 3: Server Side Programming:

Java servlet: Architecture – Servlet life cycle – Parameter data – Sessions – Cookies – Other servlet capabilities – Data storage –Servlet and concurrency- NodeJS

Module 4: JSP Programming:

Introduction to Java Server Pages – JSP and servlets – Running JSP applications - Basic JSP – Java beans classes and JSP - Tag libraries and files.

Module 5: Web Services

Web services concepts - Writing java web services – Web services for clients – WSDL – Representing data types: XML schema – Communicating object data: SOAP – SOAP encoding of struct data.

Text Book:

1. Jeffrey C Jackson, Web Technology – A computer Science perspective, Person Education, 2009.
2. Chris Bates, Web Programming – Building Internet Applications, Wiley India, 2006.
3. Gopalan. N.P, Web Technology A Developer Perspectives, PHI, 2010.

References

1. Deitel, Deitel and Neito, INTERNET and WORLD WIDE WEB – How to program, Pearson education, 2011.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 5 TH SEM / 3RD YEAR

COURSE CODE : 21CA3501

TITLE OF THE COURSE : INFORMATION AND NETWORK SECURITY

L: T/A: P: C : 2: 1: 0: 3

COURSE OBJECTIVES:

1. To understand the fundamentals of Cryptography
2. To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
3. To understand the various key distribution and management schemes.
4. To understand how to deploy encryption techniques to secure data in transit across data networks
5. To design security applications in the field of Information technology

COURSE OUTCOMES: At the end of the course students will be able to:

1. Implement basic security algorithms required by any computing system.
2. Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
3. Analyze the possible security attacks in complex real time systems and its effective countermeasures.
4. Identify the security issues in the network and resolve it.
5. Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations
6. Formulate research problems in the computer security field

MODULE 1 - INTRODUCTION 9hrs

An Overview of Computer Security-Security Services-Security Mechanisms-Security Attacks-Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

MODULE 2 - CRYPTOSYSTEMS & AUTHENTICATION 9hrs

Classical Cryptography-Substitution Ciphers-permutation Ciphers-Block Ciphers - DES Modes of Operation- AES-Linear Cryptanalysis, Differential Cryptanalysis- Hash Function -
SHA 512- Message Authentication Codes-HMAC - Authentication Protocols

MODULE 3 - PUBLIC KEY CRYPTOSYSTEMS 9 hrs

Introduction to Public key Cryptography- Number theory- The RSA Cryptosystem and Factoring Integer-Attacks on RSA-- Digital Signature Algorithm-Finite Fields-Elliptic Curves Cryptography- Key management – Session and Interchange keys, Key exchange and generation-PKI

MODULE 4 - SYSTEM IMPLEMENTATION

Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem Secure Software Development: Secured Coding - OWASP/SANS Top Vulnerabilities -Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference – Application Controls.

MODULE 5 - NETWORK SECURITY **9 hrs**

Secret Sharing Schemes-Kerberos- Pretty Good Privacy (PGP)-Secure Socket Layer (SSL)- Intruders – HIDS- NIDS - Firewalls – Viruses.

Text Books

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education,2006.
2. Matt Bishop, "Computer Security art and science", Second Edition, Pearson Education, 2002

Reference Books

1. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007
2. Jonathan Katz, and Yehuda Lindell, Introduction to Modern Cryptography, CRC Press, 2007
3. Douglas R. Stinson, "Cryptography Theory and Practice", Third Edition, Chapman & Hall/CRC, 2006 4. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, First Edition, 2006.

5. Network Security and Cryptography, Menezes Bernard, Cengage Learning, New Delhi, 2011
6. Man, Young Rhee, Internet Security, Wiley, 2003

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 5TH SEM / 3RD YEAR
COURSE CODE : 21CA3504
TITLE OF THE COURSE : BIG DATA ANALYTICS USING HADOOP
L: T/A: P: C : 2: 1: 2: 4

COURSE OBJECTIVES:

1. To Learn business case studies for big data analytics
2. To Understand NoSQL big data management
3. To manage Big data without SQL
4. To understanding map-reduce analytics using Hadoop and related tools

COURSE OUTCOMES: At the end of the course students will be able to:

1. Describe big data and use cases from selected business domains
2. Explain NoSQL big data management
3. Install, configure, and run Hadoop and HDFS
4. Perform map-reduce analytics using Hadoop
5. Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics

MODULE 1 - UNDERSTANDING BIG DATA 9hrs

What is big data – why big data – Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System, Grid Computing, Volunteer Computing, convergence of key trends – unstructured data – industry examples of big data –big data and healthcare – big data in medicine – advertising and big data.

MODULE 2 - NOSQL DATA MANAGEMENT 9hrs

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships –graph databases – schema less databases – materialized views – distribution models – sharding –– version – Map reduce –partitioning and combining – composing map-reduce calculations

MODULE 3 - BASICS OF HADOOP 9 hrs

Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression– serialization – Avro – file-based data structures.

MODULE 4 - MAPREDUCE APPLICATIONS 9 hrs

MapReduce workflows – unit tests with MR Unit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution –MapReduce types – input formats – output formats

MODULE 5 - HADOOP RELATED TOOLS

HBase – data model and implementations – HBase clients – Hbase examples –praxis. Cassandra – Cassandra data model –Cassandra examples – Cassandra clients –Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation –HiveQL queries.

Text Books

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

Reference Books

1. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.
2. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
3. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
4. Alan Gates, "Programming Pig", O'Reilley, 2011.

DAYANANDA SAGAR UNIVERSITY

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Department of Computer Applications

SEMESTER/YEAR : 5TH SEM / 3RD YEAR
COURSE CODE : 21CA3505
TITLE OF THE COURSE : DATABASE ADMINISTRATION
L: T/A: P: C : 2: 1: 2: 4

COURSE OBJECTIVES

1. To be able to gain suitable expertise in maintenance of a database
2. Its availability and to ensure security controls are adequate and are functioning as intended within the operating system.

COURSE OUTCOMES: At the end of the course students will be able to:

1. To be able to implement a simple DBMS and design and implement information systems using DBMS technology.

MODULE 1 **9hrs** Introduction - DBMS architecture and data independence, DBA roles and responsibilities. SQL *PLUS Overview - SQL Plus Fundamentals, producing more readable outputs, accepting values at runtime, Using iSQL *Plus

MODULE 2 **9hrs**

Modifying Data-Introduction to DML Statements, Truncating a table, Transaction control language. Managing Constraints-Creating constraints, Drop constraints, enabling and disabling constraints, deferring constraints checks. Managing Views-Creating and modifying views, Using views, Inserting, Updating and deleting data through views. User Access and Security-Creating and modifying use accounts, creating and using roles, granting and revoking privileges, Managing user groups with profiles.

MODULE 3 **9 hrs**

Oracle Overview and Architecture-An overview of logical and physical storage structures, Oracle memory structures, Oracle background processes, connecting to oracle instance, processing SQL command.

Managing Oracle-starting up the oracle instance, managing sessions, shutting down the oracle instance, instances messages and instance alerts.

Control and Redo Log Files-Managing the control files, Maintaining and monitoring redo log files

MODULE 4 **9 hrs**

Managing Tables, indexes and Constraints-Storing data (create, alter, analysing, querying table information), Managing indexes, Managing constraints

Managing Users and Security-Profiles, Managing users, managing privileges, managing roles, querying role information.

MODULE 5

Introduction to Network Administration-Network design considerations, network responsibilities for the DBA, network configuration, Overview of oracle Net features, Oracle Net Stack Architecture. Backup and Recovery Overview-Database backup, restoration and recovery, Types of failure in oracle environment, defining a backup and recovery strategy, Testing the backup and recovery plan

Text Books

1. C.J. Date, Database Systems, Addison Wesley, 2000
2. Chip Dawes, Biju Thomas, Introduction to Oracle 9i SQL, BPB, 2002
3. Bob Bryla, Biju Thomas, Oracle 9i DBA Fundamental I, BPB, 2002
4. Doug Stums, Matthew Weshan, Oracle 9i DBA Fundamental I, BPB, 2002
5. Joseph C. Johnson, Oracle 9i Performance Tuning., BPB, 2002

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 5TH SEM / 3RD YEAR
COURSE CODE : 21CA3506
TITLE OF THE COURSE : MOBILE PROGRAMMING
L: T/A: P: C : 2: 1: 2: 4

COURSE OBJECTIVES

1. Understand the basic concepts of mobile computing
2. Be familiar with the network protocol stack
3. Learn the basics of mobile telecommunication system
4. Be exposed to Ad-Hoc networks
5. Gain knowledge about different mobile platforms and application Development.

COURSE OUTCOMES: At the end of the course students will be able to:

1. Acquire technical competency and skills in developing applications using Android.

MODULE 1 - INTRODUCTION 9hrs

Characteristics and advantages of mobile communication, types of mobile applications – development approaches, overview of mobile strategy and designing mobile solutions. Mobile computing project structure, building and testing. Evolution of Modern Mobile
Wireless communication system. Mobile computing vs. wireless - MAC Protocols –Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

MODULE 2 - MOBILE PLATFORMS AND APPLICATIONS 9hrs

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone –M-Commerce – Structure – Pros & Cons – Mobile Payment System.

MODULE 3 - INTRODUCTION TO ANDROID 9 hrs

Android: Introduction, trends, platforms, Android Development Setup like, Android Studio, Eclipse, Android SDK, tools. Emulator setup. App Behaviour on the Android Runtime (ART). Platform Architecture. Application framework and basic App Components resources.

MODULE 4 - MOBILE APP DEVELOPMENT USING ANDROID 9 hrs

Android App Use Case (Use Case Diagram (UML))
Implement user Interface - layout, values, asset XML representation, generated R.Java file, Android manifest file. Activities, Intent and UI Design - activities life-cycle. Android Components – layouts, fragments, basic views, list views, picker views, adapter views, Menu, Action Bar etc. - Managing data using SQLite database.

MODULE 5 - DATA PERSISTENCE AND GOOGLE APIs FOR ANDROID 9 hrs

Managing data using SQLite, user content provider and persisting data into database Google APIs for Android - Maps, Cloud Messaging, Authentication, Storage, Hosting and Google Play services.

Text Books

1. Learning Android by Marko GargentaO'reilly Publications
2. Professional Android™ Application Development by Reto Meier ,Wrox Publication
3. Head First Android Development by Jonathan Simon O'reilly Publications

Reference Books

1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 5TH SEM / 3RD YEAR
COURSE CODE : 21CA3507
TITLE OF THE COURSE : MOBILE SECURITY
L: T/A: P: C : 2: 1: 2: 4
COURSE OBJECTIVES:

1. The objective of the course is to make students study the importance of the mobile security

COURSE OUTCOMES: At the end of the course students will be able to:

1. Identify and define key terms related to mobile security 2. To implement security in mobile applications.

MODULE 1 - INTRODUCTION 9hrs

Introduction to Mobile Security - Building Blocks – Basic security and cryptographic techniques.

MODULE 2 - NETWORK SECURITY 9hrs

Security of GSM Networks - Security of UMTS Networks - LTE Security - WiFi and Bluetooth Security- SIM/UICC Security - Mobile Malware and App Security

MODULE 3 - SECURITY MODELS 9 hrs

Android Security Model - IOS Security Model - Security Model of the Windows Phone - SMS/MMS, Mobile Geolocation and Mobile Web Security - Security of Mobile VoIP Communications.

MODULE 4 - MOBILE APPLICATION SECURITY MEASURES 9 hrs

How to secure mobile application? Models to develop and secure Android applications - Security detection and measures in iOS.

MODULE 5 - TRENDS IN MOBILE SECURITY 9 hrs

Emerging Trends in Mobile Security- Trends in mobile device management – Device requirements for MDM- configuration and hardening, encryption, backup and recovery, remote wipe, patch management, enterprise VPN and proxy.

Text Books

1. Mobile Application Security, Himanshu Dviwedi, Chris Clark and David Thiel, 1st Edition.
2. Security of Mobile Communications, Noureddine Boudriga, 2009

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 5TH SEM / 3RD YEAR
COURSE CODE : 21CA3508
TITLE OF THE COURSE : LINUX OPEN-SOURCE SYSTEM
L: T/A: P: C : 2: 1: 2: 4

COURSE OBJECTIVES:

1. Be exposed to the context and operation of free and open-source software (FOSS) communities and associated software projects.
2. Be familiar with participating in a FOSS project
3. Learn scripting language like Python or Perl
4. Learn programming language like Ruby
5. Learn some important FOSS tools and techniques

COURSE OUTCOMES: At the end of the course students will be able to:

1. Install and run open-source operating systems.
2. Gather information about Free and Open-Source Software projects from software releases and from sites on the internet.
3. Build and modify one or more Free and Open-Source Software packages.
4. Use a version control system.
5. Contribute software to and interact with Free and Open-Source Software development projects.

MODULE 1 **9hrs**

PHILOSOPHY - Notion of Community--Guidelines for effectively working with FOSS community.
LINUX - Linux Installation and Hardware Configuration – Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - BootTime Kernel Options- X Windows System Configuration-System Administration – Backup and Restore Procedures- Strategies for keeping a Secure Server.

MODULE 2 **9hrs**

LINUX Administration
Send mail, SQUID, Samba, IPChain.

MODULE 3 **9 hrs**

Linux –CREATING USER PROFILE, USER SECURITY, GROUP CREATION,

MODULE 4 9 hrs

ADVANCED SCRIPTING USING PYTHON
Case studies

MODULE 5 **9 hrs**

PROGRAMMING TOOLS AND TECHNIQUESVersion Control Systems like Git or equivalent, –Bug Tracking Systems- Package
Management Systems

Text Books

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.

Reference Books

1. Philosophy of GNU URL: http://www.gnu.org/philosophy/.
2. Linux Administration URL: http://www.tldp.org/LDP/lame/LAME/linux-admin-madeeasy/.
3. The Python Tutorial available at http://docs.python.org/2/tutorial/.
4. Perl Programming book at http://www.perl.org/books/beginning-perl/.
5. Ruby programming book at http://ruby-doc.com/docs/ProgrammingRuby/.
6. Version control system URL: http://git-scm.com/.
7. Samba: URL: http://www.samba.org/.
8. Libre office: http://www.libreoffice.org/.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 5TH SEM / 3RD YEAR
COURSE CODE : 21CA3509
TITLE OF THE COURSE : WIRELESS AND MOBILE SECURITY
L: T/A: P: C : 2: 1: 2: 4

COURSE OBJECTIVES:

1. Gain knowledge on security and privacy topics in wireless and mobile networking
2. Understand the security and privacy problems in the realm of wireless networks and mobile computing

COURSE OUTCOMES: At the end of the course students will be able to:

1. Apply proactive and defensive measures to counter potential threats, attacks and intrusions
2. Analyze the various categories of threats, vulnerabilities, countermeasures in the area of wireless and mobile networking
3. Design secured wireless and mobile networks that optimize accessibility whilst minimizing vulnerability to security risks
4. Research in the field of mobile and wireless security and privacy

MODULE 1 - INTRODUCTION TO WIRELESS NETWORKS SECURITY 9hrs

Wired vs. wireless network security, Threat categories and the OSI model, Vulnerabilities, Countermeasures, Security architectures. IEEE 802.11 standard security issues: Authentication and authorization mechanisms, Confidentiality and Integrity, pre-RSNA protocols (WEP), RSNA (802.11i), Key management, Threat analysis and case studies. Mobile networks security

MODULE 2 - MOBILE SECURITY 9hrs

Mobile system architectures, Overview of mobile cellular systems, GSM and UMTS Security architecture & Attacks, Vulnerabilities in Cellular Services, Cellular Jamming, Attacks & Mitigation, Security in Cellular VoIP Services, Mobile application security.

MODULE 3 - SECURING WIRELESS NETWORKS 9 hrs

Overview of Wireless security, Scanning and Enumerating 802.11 Networks, Attacking 802.11 Networks, Attacking WPA protected 802.11 Networks, Bluetooth Scanning and Reconnaissance, Bluetooth Eavesdropping, Attacking and Exploiting, Bluetooth, Zigbee Security, Zigbee Attacks

MODULE 4 - RFID Security 9 hrs

Introduction, RFID Security and privacy, RFID chips Techniques and Protocols, RFID anti-counterfeiting, Man-in-the-middle attacks on RFID systems, Digital Signature Transponder, Combining Physics and Cryptography to Enhance Privacy in RFID
Systems, Scalability Issues in Large- Scale Applications, An Efficient and Secure RFID

Security Method with Ownership Transfer, Policy- based Dynamic, Privacy Protection Framework leveraging Globally Mobile RFIDs, User-Centric, Security for RFID based Distributed Systems, Optimizing RFID protocols for Low Information Leakage, RFID: an anti-counterfeiting tools.

MODULE 5 **9 hrs**

Reputation and Trust, Intrusion Detection, Vulnerabilities, Analysis of Mobile Commerce platform, secure authentication for mobile users, Mobile commerce security, payment methods, Mobile Coalition key evolving Digital Signature scheme for wireless mobile Networks

Text Books

1. Jeffrey C Jackson, Web Technology – A computer Science perspective, Person Education, 2009.
2. Chris Bates, Web Programming – Building Internet Applications, Wiley India, 2006.
3. Gopalan. N.P, Web Technology A Developer Perspectives, PHI, 2010.

Reference Books

1. Deitel, Deitel and Neito, INTERNET and WORLD WIDE WEB – How to program, Pearson edu

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 5TH SEM / 3RD YEAR
COURSE CODE : 21CA3512
TITLE OF THE COURSE : COMPUTER GRAPHICS AND MULTIMEDIA
L: T/A: P: C : 2: 1: 2: 4

COURSE OBJECTIVES:

Gain knowledge about graphics hardware devices and software used.

1. Understand the two-dimensional graphics and their transformations.
2. Understand the three-dimensional graphics and their transformations.
3. Appreciate illumination and color models.
4. Be familiar with understand clipping techniques.

COURSE OUTCOMES:

At the end of the course, the student should be able to:

1. Design and apply of two-dimensional transformations.
2. Design and apply of three-dimensional transformations.
3. Apply clipping techniques to graphics.
4. Design animation sequences.

MODULE 1 - OUTPUT PRIMITIVES: 9 hrs

Introduction – Points and Lines – DDA Algorithm – Circle-Generating Algorithms – Ellipse-Generating Algorithms – Parallel Curve Algorithms – Curve Functions – Attributes.

MODULE 2- TWO-DIMENSIONAL GEOMETRIC TRANSFORMATIONS & VIEWING: 9 hrs

Basic Transformation – Matrix Representations – Composite Transformation – Other Transformations – Affine Transformation – The viewing Pipeline – Clipping Operation – Point Clipping – Line Clipping – Polygon Clipping – Curve Clipping – Text Clipping – Exterior Clipping

MODULE 3 - INTRODUCTION: 9 hrs

Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases.

MULTIMEDIA COMPRESSION: Types of Compression – Binary Image Compression Schemes – Color, Gray Scale, And Still-video Image compression – Video Image Compression – Audio Compression.

MODULE 4 - MULTIMEDIA DATA & FILE FORMAT STANDARDS: 9 hrs

Rich-Text Format – TIFF - RIFF – MIDI – JPEG – AVI – MPEG- TWAIN- Multimedia I/O technologies - Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval Technologies.

MULTIMEDIA AUTHORING, USER INTERFACE & HYPERMEDIA: Multimedia Authoring Systems – Hypermedia Application Design Consideration – User Interface Design - Hypermedia messaging - Mobile Messaging – Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards – Integrated Document management

MODULE 5 - COLOR MODELS & COMPUTER ANIMATION: Properties of Light – 9 hrs

Standard Primaries – Intuitive Color Concepts – Color models – Color Selection and Application – Computer Animation: Design of Animation Sequences – Raster Animation – Key-Frame Systems Morphing – Motion Specifications – Virtual Reality case study.

Text Books

1. Donald Hearn and Pauline Baker M, “Computer Graphics C Version”, Pearson Education, New Delhi, 2003.
2. Foley, Vandam, Feiner and Huges, “Computer Graphics: Principles & Practice”, Pearson Education, Asia, 2003.

Reference Books

1. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems Design”, Prentice Hall of India, New Delhi 2003. 2. Judith Jeffcoate, “Multimedia in practice technology and Applications”, Prentice Hall of India, New Delhi, 2009.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 6TH SEM / 3RD YEAR
COURSE CODE : 21CA3601
TITLE OF THE COURSE : ADVANCE DATABASE (NOSQL)
L: T/A: P: C : 2: 1: 2: 4

COURSE OBJECTIVES:

1. Understand NOSQL Basics
2. Understand the NOSQL Storage Architecture.
3. Be familiar with the application of NOSQL in cloud and parallel processing.

COURSE OUTCOMES: At the end of the course students will be able to:

1. Design and develop web applications with NOSQL.

MODULE 1 - INTRODUCTION TO NOSQL **9hrs**

Definition of NOSQL, History of NOSQL and Different NOSQL products, Exploring MongoDB Java/Ruby/Python, Interfacing and Interacting with NOSQL

MODULE 2 - NOSQL BASICS **9hrs**

NOSQL Storage Architecture, CRUD operations with MongoDB, Querying, Modifying and Managing NOSQL Data stores, Indexing and ordering datasets (MongoDB / CouchDB / Cassandra)

MODULE 3 - ADVANCED NOSQL **9 hrs**

NOSQL in CLOUD, Parallel Processing with Map Reduce, BigData with Hive

MODULE 4 - WORKING WITH NOSQL **9 hrs**

Surveying Database Internals, Migrating from RDBMS to NOSQL, Web Frameworks and NOSQL, using MySQL as a NOSQL

MODULE 5 - DEVELOPING WEB APPLICATION WITH NOSQL AND NOSQL ADMINISTRATION **9 hrs**

PHP and MongoDB, Python and MongoDB, Creating Blog Application with PHP, NOSQL Database Administration

Text Books

1. "Professional NOSQL" by Shashank Tiwari, 2011, WROX Press
2. The Definitive guide to MongoDB, The NoSQL Database for Cloud and Desktop Computing, Apress 2010

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 6TH SEM / 3RD YEAR
COURSE CODE : 21CA3603
TITLE OF THE COURSE : GAME PROGRAMMING
L: T/A: P: C : 2: 2: 2: 4
COURSE OBJECTIVES:

1. Understand the concepts of Game design and development.
2. Learn the processes, mechanics and issues in Game Design.
3. Be exposed to the Core architectures of Game Programming.
4. Know about Game programming platforms, frame works and engines.
5. Learn to develop games.

COURSE OUTCOMES: At the end of the course students will be able to:

1. At the end of the course, the student should be able to:
2. Discuss the concepts of Game design and development.
3. Design the processes, and use mechanics for game development.
4. Explain the Core architectures of Game Programming.
5. Use Game programming platforms, frame works and engines.
6. Create interactive Games.

MODULE 1 - 3D GRAPHICS FOR GAME PROGRAMMING 9hrs

3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.

MODULE 2 - GAME ENGINE DESIGN 9hrs

Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling

MODULE 3 - GAME PROGRAMMING 9 hrs

Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.

MODULE 4 - GAMING PLATFORMS AND FRAMEWORKS 9 hrs

2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - DX Studio, Unity.

MODULE 5 - GAME DEVELOPMENT 9 hrs

Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi-Player games.

Text Books

1. Mike Mc Shaffrfy and David Graham, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012. 2. Jason Gregory, "Game Engine Architecture", CRC Press / A K Peters, 2009.
3. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real- Time Computer Graphics" 2nd Editions, Morgan Kaufmann, 2006.

Reference Books

1. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 2nd Edition Prentice Hall / New Riders, 2009.
2. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", 3rd Edition, Course Technology PTR, 2011.
3. Jesse Schell, The Art of Game Design: A book of lenses, 1st Edition, CRC Press, 2008.

DAYANANDA SAGAR UNIVERSITY

School of Engineering

Department of Computer Applications

SEMESTER/YEAR : 6TH SEM / 3RD YEAR
COURSE CODE : 21CA3604
TITLE OF THE COURSE : NETWORK ADMINISTRATION
L: T/A: P: C : 2: 2: 2: 4
COURSE OBJECTIVES

To learn the fundamentals of Network Administration.

COURSE OUTCOMES: At the end of the course students will be able to:

1. To understand the networking basic concepts
2. How to perform disk partition
3. To configure the network in Linux

MODULE 1 - INTRODUCTION TO LINUX NETWORKING 9hrs

Introduction to Linux networking - Network Interface - IP addressing 1.4 IP V-4 and IP V-6 - Configuring the hostname - Communicating with network systems

MODULE 2 - BOOT SEQUENCE & PACKAGE MANAGEMENT WITH RPM 9hrs Boot Loader - GRUB - MBR - Introduction to rpm and using rpm command to install packages - Updating packages - Uninstalling packages - Querying for the installed packages - RPM Verifications.

MODULE 3 - DISK PARTITIONS AND FILE SYSTEMS 9 hrs

Creating new disk partitions - Managing Partitions - Creating file systems - Mounting file system - Gnome-mount - Exploring Devices - Managing /dev - Software RAID - LVM

MODULE 4 - INTRODUCTION TO LINUX SERVERS 9 hrs

Server and client architecture - Introduction to Linux servers - DNS Server - BIND - Samba Server - DHCP Server – Send mail Server - Configuring DHCP Server and assigning IP address dynamically - Configuring samba server-IP Chain - SQUID.

MODULE 5 - NETWORK CONFIGURATION 9 hrs

Change Network Interface Settings - Network Diagnostic tools - ping – traceroute – Host – dig – netstat

Text Books

1. RHCE Study Guide by Michael Jang, Tata Mc Graw Hill Education Pvt. Ltd. 2011
2. Linux Administration, A Beginner's Guide, by Wale Soyinka, Tata Mc Graw Hill Publication 2010.

Reference Books

1. Redhat Linux Networking and System Administration, by Terry Collings and Kurt Wall. Wiley India Publication 2011.
2. RHEL 6 administration by Sander Van Vugt 5. Red Hat Certified System Administrator & Engineer by Asghar gori.

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Department of Computer Applications

SEMESTER/YEAR : 6TH SEM / 3RD YEAR
COURSE CODE : 21CA3605
TITLE OF THE COURSE : ETHICAL HACKING
L: T/A: P: C : 2: 2: 2: 4
COURSE OBJECTIVES:

1. To learn about the importance of information security
2. To learn different scanning and enumeration methodologies and tools
3. To understand various hacking techniques and attacks
4. To be exposed to programming languages for security professionals
5. To get familiarized with the different phases in penetration testing

COURSE OUTCOMES: At the end of the course students will be able to:

1. Defend hacking attacks and protect data assets
2. Defend a computer against a variety of security attacks using various tools
3. Practice and use safe techniques on the World Wide Web

MODULE 1 - INTRODUCTION TO HACKING 9hrs

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack –Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Foot printing – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines.

MODULE 2 - SCANNING AND ENUMERATION 9hrs

Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.

MODULE 3 - SYSTEM HACKING 9 hrs

Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Counter measures – Escalating Privileges – Executing Applications – Key loggers and Spyware.

MODULE 4 - PROGRAMMING FOR SECURITY PROFESSIONALS 9 hrs

Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures.

MODULE 5 - PENETRATION TESTING 9 hrs Introduction – Security Assessments – Types of Penetration Testing- Phases of Penetration
Testing – Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools

Text Books

1. Ec-Council, "Ethical Hacking and Countermeasures: Attack Phases", Delmar Cengage Learning, 2009.
2. Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning, 2012.

Reference Books

1. Patrick Engebretson, "The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy", Syngress Media, Second Revised Edition, 2013. 2. Jon Erickson, "Hacking: The Art of Exploitation", No Starch Press, Second Edition, 2008.

SEMESTER/YEAR : 6TH SEM / 3RD YEAR
COURSE CODE : 21CA3607
TITLE OF THE COURSE : DATA SCIENCE
L: T/A: P: C : 2: 2: 2: 4
COURSE OBJECTIVES

1. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset.
2. Students will learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication.

COURSE OUTCOMES: At the end of the course students will be able to:

1. Describe what Data Science is and the skill sets needed to be a data scientist.
2. Explain in basic terms what Statistical Inference means. Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data.
3. Use R to carry out basic statistical modeling and analysis.
4. Explain the significance of exploratory data analysis in data science. Apply basic tools to carry out EDA.

MODULE 1 - INTRODUCTION 9hrs

What is Data Science? Big Data and Data Science hype and getting past the hype - Why now? Datafication - Current landscape of perspectives - Skill sets needed
Statistical Inference - Populations and samples- Statistical modeling, probability distributions, fitting a model - Intro to R.

MODULE 2 - EXPLORATORY DATA ANALYSIS AND THE DATA SCIENCE PROCESS 9hrs

Basic tools of EDA - Philosophy of EDA - The Data Science Process
Three Basic Machine Learning Algorithms - Linear Regression- k-Nearest Neighbors (k-NN) - k-means.

MODULE 3 - MACHINE LEARNING ALGORITHM AND USAGE IN APPLICATIONS 9hrs

Motivating application: Filtering Spam- Why Linear Regression and k-NN are poor choices for Filtering Spam- Naive Bayes and why it works for Filtering Spam- Data Wrangling: APIs and other tools for scrapping the Web
Feature Generation and Feature Selection - Motivating application: user retention - Feature Generation - Feature Selection algorithms – Filters, Wrappers, Decision Trees, Random Forests

MODULE 4 - RECOMMENDATION SYSTEMS 9 hrs

Building a User-Facing Data Product- Algorithmic ingredients of a Recommendation Engine - Dimensionality Reduction- Singular Value Decomposition- Principal Component Analysis

Mining Social-Network Graphs - Social networks as graphs- Clustering of graphs- Direct discovery of communities in graphs- Partitioning of graphs- Neighborhood properties in graphs.

MODULE 5 - DATA VISUALIZATION **9 hrs**

Basic principles, ideas and tools for data visualization- Examples of inspiring (projects Data Science and Ethical Issues privacy, security, ethics-- Next-generation data scientists.

Text Books

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.

Reference Books

1. Mohammed J. Zaki and Wagner Miera Jr. Data Mining and Analysis: Fundamental Concepts and Algorithms. Cambridge University Press. 2014.
2. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 0123814790. 2011.

DAYANANDA SAGAR UNIVERSITY

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Department of Computer Applications

COURSE CODE : 21CA3608
TITLE OF THE COURSE CLOUD COMPUTING
L: T/A: P: C 2: 2: 2: 4

COURSE OBJECTIVES:

1. To understand the various issues in cloud computing
2. To familiarize themselves with the lead players in cloud
3. To appreciate the emergence of cloud as the next generation computing paradigm
4. To be able to set up a private cloud

COURSE OUTCOMES: At the end of the course students will be able to:

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing
2. Identify the architecture, infrastructure and delivery models of cloud computing
3. Explain the core issues of cloud computing such as security, privacy and interoperability.
4. Choose the appropriate technologies, algorithms and approaches for the related issues

MODULE 1 - INTRODUCTION 9hrs

Evolution of Cloud Computing -System Models for Distributed and Cloud Computing - NIST Cloud Computing Reference Architecture -IaaS - On-demand Provisioning - Elasticity in Cloud - Examples of IaaS Providers - PaaS - Examples of PaaS Providers - SaaS - Examples of SaaS Providers - Public, Private and Hybrid Clouds – Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Nimbus.

MODULE 2 - VIRTUALIZATION 9hrs

Basics of Virtual Machines - Process Virtual Machines – System Virtual Machines – Emulation – Interpretation – Binary Translation - Taxonomy of Virtual Machines. Virtualization – Management Virtualization –– Hardware Maximization – Architectures – Virtualization Management – Storage Virtualization – Network Virtualization.

MODULE 3 - VIRTUALIZATION INFRASTRUCTURE 9 hrs

Comprehensive Analysis – Resource Pool – Testing Environment –Server Virtualization – Virtual Workloads – Provision Virtual Machines –Desktop Virtualization – Application Virtualization – Work with AppV – Mobile OS for smart phones – Mobile Platform Virtualization – Collaborative Applications for Mobile platforms

MODULE 4 - PROGRAMMING MODEL **9 hrs**

Map Reduce Hadoop Distributed File Systems – Hadoop I/O – Developing Map Reduce Applications – Working of Map Reduce – Types and Formats – Setting up Hadoop Cluster .

MODULE 5 - CLOUD INFRASTRUCTURE AND SECURITY **9 hrs**

Architectural Design of Compute and Storage Clouds - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment - Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software as a Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security.

Text Books

1.Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012. 2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

3. Jim Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
4. Danielle Ruest, Nelson Ruest, “Virtualization: A Beginner‟s Guide”, McGraw-Hill Osborne Media, 2009.
5. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, “Mastering Cloud Computing”, Tata McGraw Hill, 2013