MASTER OF COMPUTER APPLICATIONS (MCA)

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2022 – 2023)

Enable | Enlighten | Enrich
KARPAGAM
ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)

DEPARTMENT OF COMPUTER APPLICATIONS

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT (FASCM)

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)
(Accredited with A+ Grade by NAAC in the Second Cycle)
Eachanari (Post), Coimbatore – 641 021.
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FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT (FASCM)

POST – GRADUATE PROGRAMME

(MCA)

(REGULAR PROGRAMME)

REGULATIONS
(2022)

CHOICE BASED CREDIT SYSTEM (CBCS)

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FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

MCA DEGREE PROGRAMME

REGULAR MODE

REGULATIONS - 2022

The following Regulations are effective from the academic year 2022-2023 and are applicable to the candidates admitted in the MCA degree programme in the Faculty of Arts, Science, Commerce and Management, Karpagam Academy of Higher Education.

1 PROGRAMME OFFERED

MODE OF STUDY AND ADMISSION REQUIREMENTS

1.1 MODE OF STUDY

Full-Time:
This programme is offered under Full-time Regular mode. Candidates admitted under 'Full-Time' should be present in the Karpagam Academy of Higher Education during the complete working hours for curricular and co-curricular activities assigned to them.

1.2 ADMISSION REQUIREMENTS (Eligibility)

Regular candidates for admission to the first semester of the MCA Degree Programme shall be required to have passed any Degree Examination with mathematics at +2 level or any degree with at least one course in maths/business maths/statistics at any degree level of this Karpagam Academy of Higher Education or any other University

accepted by the Karpagam Academy of Higher Education as equivalent thereto.

2 DURATION OF THE PROGRAMMES

2.1 The minimum and maximum period for completion of the P.G. Programmes are given below:

Programme	Min. No. of Semesters	Max. No. of Semesters
MCA (Regular)	4	8

2.2 Each semester consists typically of 90 working days (with 7 hours per day) or 630 hours for a full-time mode of study. The examination shall be conducted at the end of every semester for the respective courses.

3. CHOICE BASED CREDIT SYSTEM

Credits

3.1 This programme is offered under Choice Based Credit System with the total credits of 91 for MCA Regular candidates.

4. STRUCTURE OF THE PROGRAMME

The MCA programme will have a curriculum and syllabi consisting of 85% compulsory courses and 15% elective courses and project work.

a. Core Course

The core consists of theory and practical, and the examinations shall be conducted at the end of each semester. Students have to earn 47 Credits in Core Course.

b. Elective Course

Elective courses are chosen with the approval of the Head of Department from the list of elective courses mentioned in the curriculum. Open Elective Course is offered to the PG Students

and it is chosen with the approval of the Head of Department. Students have to earn 20 Credits in Elective Course, 2 Credits in Open Elective Course and 6 Credits in Allied Courses.

C. Project Work

The candidates shall undertake the project work in the Fourth Semester either in the Department or Industry, Institute or any other Organisation, and the project report shall be submitted at the end of the fourth semester. Students have to earn 14 Credits in Project Work.

If the candidate undertakes the project work outside the Department, the teacher concerned within the Department shall be the Main guide and the teacher/scientist under whom the work is carried out will be the Co-guide. The candidate shall bring the attendance certificate from the place of project work carried out.

HoD shall assign a project supervisor whom the intern shall monitor the student's project work (s). A Project Assessing Committee (PAC) shall be constituted with HoD and two senior faculty members of the Department. The PAC shall announce the dates for the reviews and demonstration. The student shall make a presentation on the progress and demonstration of their project before the PAC in the presence of their supervisor on the scheduled dates.

Approval of the project

The candidate has to submit, in consultation with his/her supervisor, the title, objective and the action plan of his/her project to the PAC on the first review. Only after obtaining the approval of PAC, the student can initiate the project work.

Arrangement of content in the project report

The sequence in which the project report material should be arranged and bound as follows:

1. Cover Page & Title Page – Appendix I

2. Bonafide Certificate – Appendix II
3. Declaration – Appendix III
4. Acknowledgement
5 Abstract/Executive summary
6 Table of Contents – Appendix IV
. 7 Chapters
8 Lists of Tables
9 Lists of Figures (if any)
10. List of Symbols, Abbreviations and Nomenclature (if any)
11. Appendices (Code print out)
12. References – Appendix V

The table and figures shall be introduced in the appropriate places.

d. . Value Added Courses

Courses of varying durations but not less than 30 hours are optional and offered outside the curriculum, which add value and help the students to get the placement. Students of the MCA program are eligible to enroll for the Value Added Courses. The student can choose one Value Added Course per semester from the list of Value Added Courses available in KAHE. The examinations shall be conducted at the end of the Value Added Course at the Department level, and the student has to secure a minimum of 50% of marks to get a pass. The certificate for the Value Added Course for the passed out students shall be issued duly signed by the HOD and Dean of the Faculty concerned.

e . Internship

The candidates shall undergo 15 days Internship at the end of the Second Semester in the Industry, Institute or any other Organisation and the report shall be submitted. Students have to earn 2 Credits in Internship.

f. Open Elective

He / She may select one of the open elective courses from the list given below offered by the other department in the third semester. Students have to earn 2 credits for this course. (The student cannot select a course offered by the parent department).

S.No.	Name of the Department	Course Code	Name of the Course
1	MCA	22CAPOE301	Robotics

Online Course

The student shall study at least one online course from SWAYAM / NPTEL / MOOC in any one of the first three semesters, for which examination shall be conducted at the end of the course by the respective external agencies, if any. The student can register for the courses which are approved by the Department. The student shall produce a Pass certificate from the respective agencies before the end of the third semester. The credit(s) earned by the students will be considered as additional credit(s) over and above the minimum of the credit required to earn a particular Degree.

5. MEDIUM OF INSTRUCTION

The medium of instruction for all courses, examinations, seminar presentations and project/thesis/dissertation reports should be in English.

6. MAXIMUM MARKS

The maximum marks assigned to different courses shall be as follows:

(i) Each of the theory and practical courses shall carry a maximum of 100 marks. Out of which 40 marks are for Continuous Internal Assessment (CIA) and 60 marks are for End Semester Examinations (ESE).

(ii) Maximum marks for Project work

Sl. No.	Programme	Maximum marks	CIA	ESE
1	MCA	200	80	120

7. REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

a. Ideally, every student is expected to attend all classes and secure 100% attendance. To qualify to write ESE, the student should have attended at least 75% of the classes, and the candidate's conduct is satisfactory during the course.

b. A candidate who has secured attendance between 65% and 74% (both included) due to medical reasons (Hospitalization / Accident / Specific Illness) or due to participation in Karpagam Academy of Higher Education / District / State / National / International level sports or due to participation in Seminar / Conference / Workshop / Training Programme / Voluntary Service / Extension activities or similar programmes with prior permission from the Registrar shall be given exemption from prescribed minimum attendance requirements and shall be permitted to appear for the examinations on the recommendation of the Head of Department concerned and Dean to condone the shortage of attendance. The Head of Department has to verify and certify the genuineness of the case before recommending it to the Dean. However, the candidate has to pay the prescribed condonation fee to the Karpagam Academy of Higher Education.

c. However, a candidate who has secured attendance 64% and less in the current semester due to any reason shall not be permitted to appear for the current semester examinations. However, he/she will be permitted to appear for his/her arrear examinations, if any, and he/she has to re-do the same semester with the approval of the "Students' Affairs Committee" and Registrar.

8. a. FACULTY MENTOR

To help students in planning their courses of study and for general advice on the academic programme, the HoD shall allot a certain number of students to a faculty who will function as a faculty mentor throughout their period of study. Faculty mentors shall advise the students and monitor their behaviour and academic performances. Problems, if any, they shall be counselled by them periodically. The Faculty mentor is also responsible for informing the parents on the progress of their wards. Faculty mentor shall display the cumulative attendance particulars of his / her ward students' periodically (once in 2 weeks) on the Notice Board to enable the students to know their attendance status and satisfy **clause 7** of this regulation.

b. ONLINE COURSE COORDINATOR

To help students plan their online courses and for general advice on online courses, the HOD shall nominate a coordinator for the online courses. The Online course coordinator shall identify the courses that students can select from the available online courses offered by the different agencies periodically and inform the students. Further, the coordinators shall advise the students regarding the online courses and monitor their courses.

9. CLASS COMMITTEE

Every class shall have a Class Committee consisting of teachers of the class concerned, student representatives (Minimum two boys

and two girls of various capabilities and Maximum of 6 students) and the concerned HoD / a senior faculty as a Chairperson. The objective of the class committee meeting is all about the teaching-learning process. The class committee shall be convened at least once a month. The functions of the Class Committee shall include

- Analysing and Solving problems experienced by students in the classroom and laboratories.
- Analysing the performance of the students of class after each test and finding the ways and means to improve the performance.
- The class committee of a particular class of any department is typically constituted by the HoD / Chairperson of the Class Committee. However, if the students of different departments are mixed in a class, the class committee shall be constituted by the respective faculty Dean.
- The Class Committee shall be constituted during the first week of each semester.
- The HoD / Chairperson of the Class Committee is authorised to convene the meeting of the class committee.
- The respective Faculty Dean has the right to participate in any Class Committee meeting.
- The Chairperson is required to prepare the minutes of every meeting and submit the same to Dean within two days after having convened the meeting. Serious issues, if any, shall be brought to the notice of the Registrar by the HoD / Chairperson immediately.

10. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

10.1 Every Faculty must maintain an Attendance and Assessment Record (Log book), which consists of students' attendance marked for each lecture / practical / project work class, the test marks, lesson plan, and the record of class work (a topic covered), separately for each course. This should be submitted to the HoD once in a fortnight to check the syllabus coverage and the test marks and attendance records. The HoD shall sign with a date after due verification. The same shall be submitted to Dean once in a month. After the completion of the semester, the HoD should keep this record in safe custody for five years because records of attendance and assessment shall be submitted for Inspection as and when required by the Karpagam Academy of Higher Education / any other approved body.

10.2 **Continuous Internal Assessment (CIA)**: The performance of students in each course will be continuously assessed by the respective faculty as per the guidelines given below:

Theory Courses

S. No.	Category	Maximum Marks
1.	Attendance	5
2.	Test – I (first 2 ½ units)	10
3.	Test – II (last 2 ½ units)	10
4.	Journal Paper Analysis & Presentation*	15
	Continuous Internal Assessment: Total	40

*****Evaluated by two faculty members of the Department concerned: Subject related matter 5 marks, presentation 4 marks, question discussion 4 marks, visual aids 2 marks.

Practical Courses

S. No.	Category	Maximum Marks
1.	Attendance	05
2.	Observation work	05
3.	Record work	05
4.	Model Examination	15
5.	*Viva – voce* [Comprehensive]*	10
Continuous Internal Assessment: Total		**40**

* Includes *Viva-voce* conducted during the model practical Exam.

Every practical Exercise / Experiment shall be evaluated based on the conduct of Exercise/ Experiment and records maintained.

10.3 Pattern of Test Question Paper

Instruction	Remarks
Maximum Marks	50 marks
Duration	2 Hours
Part – A	Objective type (20 x 1=20)
Part- B	Short Answer Type (3 x 2 =6)
Part- C	3 Eight marks Questions ‘either – or’ Type Choice (3 x 8 =24 Marks)

10.4 Attendance

Marks Distribution for Attendance

S. No.	Attendance %	Maximum Marks
1	91 and above	5.0
2	81 - 90	4.0
3	76 - 80	3.0
4	Less than 75	0

11. END SEMESTER EXAMINATIONS

11.1. End Semester Examination (ESE): ESE will be held at the end of each semester for each course. The question paper is for maximum of 60 marks.

Pattern of ESE Question Paper

Instruction	Remarks
Maximum Marks	60 marks for ESE.
Duration	3 hours (½ Hr for Part – A Online & 2 ½ Hours for Parts – B and C
Part – A	20 Questions of 1 mark each (20 x 1 = 20 Marks) Question No. 1 to 20 Online Multiple Choice Questions
Part- B	5 Questions of 6 marks each (5 x 6 = 30 Marks.) Question No. 21 to 25 will be 'either-or' type, covering all five units of the syllabus; i.e., Question No. 21: Unit - I, either 21 (a) or 21 (b), Question No. 22: Unit - II, either 22 (a) or 22 (b), Question No. 23: Unit - III, either 23 (a) or 23 (b), Question No. 24: Unit - IV, either 24 (a) or 24 (b), Question No. 25: Unit - V, either 25 (a) or 25 (b)

Instruction	Remarks
Part - C	One Ten mark Question **(1 x 10 = 10 Marks)** Question No.26.

11.2 **Practical:** There shall be a combined valuation. The pattern of distribution of marks shall be as given below.

Experiments	: 40 Marks
Record	: 10 Marks
Viva-voce	: 10 Marks
Total	**: 60 Marks**

Record Notebooks for Practical Examination

Candidates taking the Practical Examination should submit Bonafide Record Notebook prescribed for the Practical Examination, failing which the candidate will not be permitted to take the Practical Examination.

In case of failure in the Practical Examination, the marks awarded for the record at the time of the first appearance of the Practical Examination shall remain the same at the subsequent appearance also by the candidate.

11.3. **Evaluation of Project Work**

11.3.1 The project shall carry a maximum mark as per clause 6 (ii). ESE will be a combined evaluation of Internal and External Examiners. There will be three reviews and a project demonstration conducted separately for 80 marks, which are detailed below. If the candidate fails to appear before the PAC for more than one review or on the day of demonstration, he/she is deemed to have failed and shall re-register for the same in the subsequent semester. The dates for the three reviews and demonstration shall be announced on the last working of the V semester.

Review Marks (45)			Paper publications in journal or paper presentation in International Conference	Project Demonstration
1st Review	2nd Review	3rd Review		
10	15	20	15	20

11.3.2 The Project report prepared according to the approved guidelines and duly signed by the supervisor(s) shall be submitted to HoD.

Guidelines to prepare the project report

a. Cover page
b. Bonafide certificate
c. Declaration
d. Acknowledgement
e. Table of contents
f. Chapters

Introduction
Aim and Objectives
Materials and Methods (Methodology)
Results (Analysis of Data) and Discussion (Interpretation)
Summary
References

11.3.3 The evaluation of the project will be based on the project report submitted and a *Viva-Voce* Examination by a team consisting of the supervisor, who will be the Internal Examiner and an External Examiner, whom the COE shall appoint. In case any one of the Examiners is not available, the HoD / a faculty nominated by the HoD shall act as an Examiner.

11.3.4 If a candidate fails to submit the project report on or before the specified date given by the Examination Section, the candidate is deemed to have failed in the Project Work and shall re-enroll for the same in a subsequent semester.

If a candidate fails in the *viva-voce* examinations, he/she has to resubmit himself/herself for the viva voce examination within 30 days from the date of declaration of the results. For this purpose, the same Internal and External examiner shall conduct the viva voce examination.

11.3.5 Copy of the approved project report after the successful completion of viva examinations shall be kept in the Karpagam Academy of Higher Education library.

12. PASSING REQUIREMENTS

12.1 Passing minimum: There is a passing minimum 20 marks out of 40 marks for CIA, and the passing minimum is 30 marks out of 60 marks in ESE. The overall passing minimum in each course is 50 out of 100 marks (Sum of the marks minimum in the CIA and ESE examination).

12.2 If a candidate fails to secure a pass in a particular course (either CIA or ESE or Both) as per clause 13.1, it is mandatory that the candidate has to register and reappear for the examination in that course during the subsequent semester when the examination is conducted for the same till he/she secures a pass both in CIA and ESE (vide Clause 2.1).

12.3 Candidates who failed in the CIA will be permitted to improve CIA marks in the subsequent semester by writing tests and resubmitting Assignments.

12.4 CIA marks(if it is pass) obtained by the candidate in the first appearance shall be retained by the Office of the Controller of Examinations and considered valid for all subsequent attempts till the candidate secures pass in ESE.

12.5 A candidate who is absent in ESE in a Course / Practical / Project Work after having enrolled for the same shall be considered to be **failed** in that examination.

13. IMPROVEMENT OF MARKS IN THE COURSES ALREADY PASSED.

Candidates desirous of improving the marks secured in a passed subject in their first attempt shall reappear once (**only in ESE**) in the subsequent semester. **The improved marks shall be considered for classification but not for ranking.** If there is no improvement, there shall be no change in the marks awarded earlier.

14. AWARD OF LETTER GRADES

All assessments of a course will be done on total marks basis. However, to report the performance of a candidate, letter grades, each carrying the certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate in each course as detailed below:

Letter grade	Marks Range	Grade Point	Description
O	91 - 100	10	OUTSTANDING
A+	81- 90	9	EXCELLENT
A	71-80	8	VERY GOOD
B+	66- 70	7	GOOD
B	61 – 65	6	ABOVE AVERAGE
C	55 - 60	5	AVERAGE
P	50 - 54	4	PASS
RA	<50	-	REAPPEARANCE
AB		0	ABSENT

15. GRADE SHEET

After the declaration of the results, Grade Sheets will be issued to each student, which will contain the following details:

i. The list of courses enrolled during the semester, and the corresponding grade scored.

ii. The Grade Point Average (**GPA**) for the semester and

iii. The Cumulative Grade Point Average (**CGPA**) of all courses enrolled from the first semester onwards.

GPA of a Semester and CGPA of a programme will be calculated as follows.

GPA of a Semester = $\dfrac{\text{Sum of the product of the GP by the corresponding credits of the courses offered in that Semester}}{\text{Sum of the credits of the courses of that Semester}}$

i.e. **GPA** of a Semester = $\dfrac{\sum_i CiGPi}{\sum_i Ci}$

Sum of the product of the GPs by the corresponding credits of the courses offered for the entire programme

CGPA of the entire programme = ----------

Sum of the credits of the courses of the entire programme

i.e. **CGPA** of the entire programme = $\dfrac{\sum_n \sum_i CniGPni}{\sum_n \sum_i Cni}$

where,

Ci is the credit fixed for the course 'i' in any semester
GPi is the grade point obtained for the course 'i' in any semester
'n' refers to the semester in which such courses are credited

Note: R.A. grade will be excluded for calculating **GPA** and **CGPA**.

16. REVALUATION

Candidate can apply for revaluation and re totaling of his / her semester examination answer script (**theory courses only**), within 2 weeks from the date of declaration of results, on payment of a prescribed fee. For the same, the prescribed application has to be sent to the Controller of Examinations through the HoD. **A candidate can apply for revaluation of answer scripts not exceeding 5 courses at a time.** The Controller of Examination will arrange for the revaluation, and the results will be intimated to the candidate through the HoD concerned**.** Revaluation is not permitted for arrear / supplementary theory courses.

17. TRANSPARENCY AND GRIEVANCE COMMITTEE

Revaluation and Re-totaling is allowed on representation (clause 16). The student may get the Xerox copy of the answer script on payment of the prescribed fee if he/she wishes. The student may represent the grievance, if any, to the Grievance Committee, which consists of Dean of the Faculty (if Dean is HoD, the Dean of another Faculty nominated by the KAHE), HoD of the Department concerned, the faculty of the course and Dean from other discipline nominated by the KAHE and the COE. If the committee feels that the grievance is genuine, the script may be sent for external valuation; the marks awarded by the External examiner will be final. The student has to pay the prescribed fee for the same.

18. ELIGIBILITY FOR THE AWARD OF THE DEGREE

A student shall be declared to be eligible for the conferment of the Degree if he / she has

- Successfully completed all the components in clause 3 and gained the required number of total credits as specified in the curriculum corresponding to his / her programme within the stipulated period.
- Not any disciplinary action is pending against him/her.
- The award of the Degree must be approved by the Board of Management.

19. CLASSIFICATION OF THE DEGREE AWARDED

19.1 Candidate who qualifies for the award of the Degree (vide clause 12) having passed the examination in all the courses in his / her first appearance, within the specified minimum number of semesters and securing a **CGPA not less than 8.0** shall be declared to have passed the examination in **First Class with Distinction.**

19.2 Candidate who qualifies for the award of the Degree (vide clause 12) having passed the examination in all the courses within the specified maximum number of semesters (vide clause 2.1), securing a **CGPA not less than 6.5** shall be declared to have passed the examination in **First Class**.

19.3 All other candidates (not covered in clauses 19.1 and 19.2) who qualify for the award of the Degree (vide Clause 18) shall be declared to have passed the examination in **Second Class**.

20. PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

20.1 A candidate, may for valid reasons and on a prior application, be granted permission to withdraw from appearing for the examination of any one course or consecutive examinations of more than one course in a semester examination.

20.2 Such withdrawal shall be permitted only once during the entire period of study of the degree programme.

20.3 Withdrawal of application is valid only if it is made within 10 days before the commencement of the examination in that course or courses and recommended by the HoD and approved by the Registrar.

20.4 Notwithstanding the requirement of mandatory TEN days notice, applications for withdrawal for exceptional cases under extraordinary conditions will be considered on the merit of the case.

20.5 Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction. This provision is not applicable to those who seek withdrawal during IV semester.

20.6 Withdrawal from the End semester examination is **NOT** applicable to arrears courses of previous semesters.

20.7 The candidate shall reappear for the withdrawn courses during the examination conducted in the subsequent semester.

21. PROVISION FOR AUTHORISED BREAK OF STUDY

21.1 **Break of Study shall be granted only once for valid reasons for a maximum of one year during the entire period of study of the degree programme.** However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons, and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the Registrar, but not later than the last date for registering for the end semester examination of the semester in question, through the HoD

stating the reasons therefore and the probable date of rejoining the programme.

21.2 The candidate thus permitted to rejoin the programme after the break shall be governed by the Curriculum and Regulations in force at the time of rejoining. Such candidates may have to do additional courses as per the Regulations in force at that period of time.

21.3 The authorised break of study (for a maximum of one year) will not be counted for the duration specified for passing all the courses for the purpose of classification. (Vide Clause 19). However, the additional break of study granted will be counted for the purpose of classification.

21.4 The total period for completion of the programme reckoned from the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 2.1 irrespective of the period of break of study (vide clause 21.3) in order that he/she may be eligible for the award of the Degree.

21.5 If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Break of Study' or 'Withdrawal' (Clause 20 and 21) is not applicable for this case.

22. RANKING

A candidate who qualifies for the PG Degree programme passing all the Examinations in the first attempt, within the minimum period prescribed for the programme of study from Semester I through Semester IV, shall be eligible for ranking. Such ranking will be confined to 10% of the total number of candidates qualified in that particular programme of study subject to a maximum of 10 ranks. **The improved marks will not be taken into consideration for ranking.**

23. SUPPLEMENTARY EXAMINATION

Supplementary examination will be conducted only for the final semester students within ten days from the date of publication of results for students who have failed in one theory course only. Such students shall apply with a prescribed fee to the Controller of Examinations within the stipulated time.

24. DISCIPLINE

24.1. If a student indulges in malpractice in any of the Internal / External Examination, he/she shall be liable for punitive action as prescribed by the Karpagam Academy of Higher Education from time to time.

24.2. Every student is required to observe discipline and decorous behaviour both inside and outside the campus and not to indulge in any activity, which will tend to bring down the reputation/prestige of the Karpagam Academy of Higher Education. The erring students will be referred to the disciplinary committee constituted by the KAHE to enquire into acts of indiscipline and recommend the disciplinary action to be taken.

25. REVISION OF REGULATION AND CURRICULUM

Karpagam Academy of Higher Education may, from time to time, revise, amend or change the Regulations, Scheme of Examinations and syllabi if found necessary.

PROGRAM OUTCOMES

On successful completion of the program the student attains

a. Engineering Knowledge: Apply the knowledge of mathematics and computing fundamentals to various real time applications for any given requirement

b. Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

c. Design/ Development of Solutions: Design solutions for complex problems and design system components or processes that meets the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

d. Conduct Investigations of Difficult Problems: Use research-based information and methods including design of applications, analysis and interpretation of data, and synthesis of the information to provide valid results.

e. Recent Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to advanced software engineering activities with an understanding of the limitations.

f. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

g. Environment and Sustainability: Understand the impact of the software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

h. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

i. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse groups, and in multidisciplinary scenarios.

j. Communication: Communicate effectively on different engineering activities with the IT community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

k. Project Management and Finance: Demonstrate knowledge and understanding of the computer engineering and management principles and apply these techniques as a member and as leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAM SPECIFIC OBJECTIVES (PSOs):

m. Enable the students to select the suitable data model, appropriate architecture and platform to implement a system with high performance.

n. Enable the students to design and integrate various system-based modules to provide user interactive solutions for various challenges.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I: To enable the students to excel in the computing profession by providing high technical foundations in the field of computer applications.

PEO II: To provide students with various computing skills like analysis, design and development of innovative software products to meet the industry needs.

PEO III: To motivate students to pursue lifelong learning and to do research as computing experts and scientists.

PEO IV: To encourage students to communicate and function effectively in teams in multidisciplinary fields within the global, social and environmental context.

MAPPING of PEOs and POs

POs	a	b	c	d	e	f	g	h	i	j	k	l
PEO1	X	X	X	X	X							
PEO2		X	X	X		X		X		X	X	X
PEO3			X		X	X	X		X		X	X
PEO4	X	X			X	X		X		X	X	X

DEPARTMENT OF COMPUTER APPLICATIONS

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT (FASCM)

PG PROGRAM (CBCS)

MASTER OF COMPUTER APPLICATIONS (MCA)

(2022–2023 Batch and onwards)

Course Code	Name of the Course	Objectives and out comes		Instruction Hours / Week			Credit(s)	Maximum Marks			Page No.
		PEOs	POs	L	T	P		CIA	ESE	Total	
								40	60	100	
SEMESTER - I											
22CAP101	Python Programming	I	c,d	5	-	-	4	40	60	100	1
22CAP102	Computer Networks	I-III	a,b,c,e,f,l	4	-	-	4	40	60	100	3
22CAP103	Design and Analysis of Algorithms	I-III	b,c,e	4	-	-	4	40	60	100	5
22CAP104	Statistical Computing	II,III	a,b,c, d,e	4	-	-	3	40	60	100	7
22CAP105	Organizational Behavior	I-IV	a,f,g, h,i,j,k ,l	4	-	-	3	40	60	100	9
22CAP111	Python Programming-Practical	I	c,d	-	-	5	2	40	60	100	11
22CAP112	Computer Networks-Practical	I-III	a,b,c, e,f,j,l	-	-	4	2	40	60	100	12
22CAP113	Design and Analysis of Algorithms - Practical	I-III	b,c,e	-	-	4	2	40	60	100	14
	Journal Paper Analysis& Presentation	-	-	1	-	-	-	-	-	-	
Semester Total				**22**	**-**	**13**	**24**	**320**	**480**	**800**	
SEMESTER – II											
22CAP201	J2EE	I-III	a,b,c, d,e,i	4	-	-	4	40	60	100	15
22CAP202	Mobile Computing	I-III	a,b,c, d,e,f, g	4	-	-	3	40	60	100	17
22CAP203	Artificial Intelligence	I-IV	a,f,g, h,i,j,k ,l	4	-	-	3	40	60	100	19
22CAP204	Elective I	I-III	a,b,c, e	4	-	-	4	40	60	100	21
22CAP205	Elective II	I-III	a,b,c,e, g,k	4	-	-	4	40	60	100	31

22CAP211	J2EE-Practical	I-III	a,b,c,d,e,i,k,l	-	-	5	2	40	60	100	41
22CAP212	Mobile Computing-Practical	I-III	a,b,c,d,e,f,g,h	-	-	4	2	40	60	100	43
22CAP213	Elective I– Practical	I-III	a,b,c,e	-	-	4	2	40	60	100	45
	Journal Paper Analysis & Presentation	-	-	1	-	-	-	-	-	-	
Semester Total		**-**	**-**	**21**	**-**	**13**	**24**	**320**	**480**	**800**	
SEMESTER – III											
22CAP301	PHP5/MySQL	I-III	a,b,c,e,f	4	-	-	4	40	60	100	55
22CAP302	.Net Programming	I-III	a,c,d,e	4	-	-	4	40	60	100	57
22CAP303	Machine Learning	II	a,b,d	4	-	-	3	40	60	100	59
22CAP304	Elective III	I-IV	b,c,e,l	4	-	-	4	40	60	100	61
22CAP305	Elective IV	I-III	a,c,d,e,f	4	-	-	4	40	60	100	71
22CAP311	PHP5/MySQL-Practical	I-III	a,b,c,e	-	-	5	2	40	60	100	82
22CAP312	.Net Programming -Practical	I-III	a,b,c,d,e	-	-	4	2	40	60	100	84
22CAP313	Elective III-Practical	I-III	a,b,c,d,e	-	-	4	2	40	60	100	86
	Journal Paper Analysis & Presentation	-	-	1	-	-	-	-	-	-	
22CAPOE301	Robotics	-	-	3	-	-	2	40	60	100	96
22CAP391	*Internship	-	-	-	-	-	2	100	-	100	98
Semester Total		-	-	**24**	**-**	**13**	**29**	**460**	**540**	**1000**	
SEMESTER – IV											
22CAP491	Project and Viva Voce	-	-	-	-	-	14	80	120	200	99
Semester Total				**-**	**-**	**-**	**14**	**80**	**120**	**200**	
Program Total				**65**	**0**	**39**	**91**	**1180**	**1620**	**2800**	

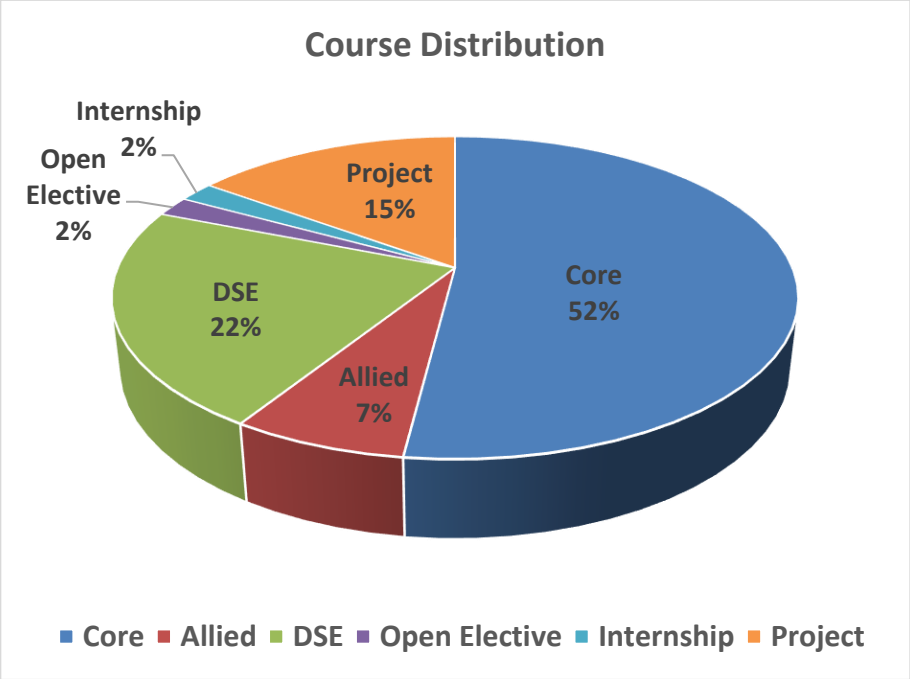
***Internship :15 days are allotted at the end of the second semester.**

Electives	Specialization	Course	
		Theory	**Practical**
I&II Sem2	**Database**	22CAP204D - Database Administration	22CAP213D- DBA–Practical
	Network	22CAP204N - Cryptography and Network Security	22CAP213N-NetworkSecurity-Practical
	Software Engineering	22CAP204S-SoftwareTestingand Quality Assurance	22CAP213S-SoftwareTestingand Quality Assurance –Practical
	Web Designing	22CAP204W-AngularJS	22CAP213W -AngularJS –Practical
	Data Science	22CAP204DS – Foundations of Data Science	22CAP213DS – Foundations of Data Science - Practical
	Database	22CAP205D-DistributedDatabase Management System	
	Network	22CAP205N-TCP/IP	
	Software Engineering	22CAP205S-ObjectOrientedAnalysis And Design with UML	
	Web Designing	22CAP205W-WebServices	
	Data Science	22CAP205DS – Natural Language Processing	
III& IV Sem3	**Database**	22CAP304D- Data Mining and Data Warehousing	22CAP313D-Data Mining and Data Warehousing -Practical
	Network	22CAP304N-Network Architecture and Management	22CAP313N – Network Simulator-Practical
	Software Engineering	22CAP304S - Software Project Management	22CAP313S Software Development - Practical Using Moodle
	Web Designing	22CAP304W –Web Programming Essential	22CAP313W- Web Programming Essential-Practical
	Data Science	22CAP304DS – Data Visualization	22CAP313DS – Data Visualization
	Database	22CAP305D-BigData Analytics	
	Network	22CAP305N-Wireless Sensor Networks	
	Software Engineering	22CAP305S-Software Metrics	
	Web Designing	22CAP305W-InternetofThings	
	Data Science	22CAP305DS – Deep Learning	

Specialization:
D-Database
N-Network
W-Web Designing
S-Software Engineering
DS- Data Science

Course Distribution

Papers	Theory	Practical	Total
Core	33	14	47
Allied	6	-	6
DSE	16	4	20
Open Elective	2	-	2
Internship	-	2	2
Project	-	14	14
Total	**57**	**34**	**91**



Semester I

22CAP101 Python Programming 5H - 4C

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives:

Enable the student

- To provide basic knowledge on Python programming concepts.
- To compute different programs using python control statements.
- To introduce different methods in list, string, tuple, dictionary and sets.
- To design user defined functions, modules, and packages.
- To learn about different functions in python.
- To compute the exception handling functions, file concepts and CSV and JSON.

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Learn python statements, comments and indentation, tokens, input and output methods using various example programs.
2. Understand different python programming concepts and apply them to develop programs.
3. Analyze the usage of different data structures for practical and contemporary applications for solving a given problem.
4. Develop functional, reliable and user-friendly Python programs for a given problem application.
5. Compute the exception handling programs, file concept programs and understand the concepts of object-oriented programming paradigm.
6. Construct applications with graphical user interface.

Unit I

Introduction: History of Python, Features of Python, Python Installation on Windows & LINUX, Installing python packages via PIP, Running python commands using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation; Basic data types - integers, Booleans etc.

Operators And Expressions: Operators- Arithmetic Operators, Comparison (Relational)Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators; Expressions and order of evaluations.

Unit II

Control Structures-Conditional Control Structures: If, else if, else; Loop control structures: for, while, for... else, while...else, nested loops, break, continue, pass.

Python Data Structures: Lists, Tuples, Dictionary: Creation, Accessing, Basic operators and methods

Unit III

Other Data Structures: Strings- creation, accessing, operators, methods; Sets- creation, accessing, operators, methods; List Comprehensions. Functions - Defining functions, Calling functions, Passing arguments, Keyword arguments, Default arguments, Variable-length arguments, Anonymous functions (lambda), fruitful Functions (Function Returning Values), Scope of the variables in a function - global and local Variables.

Unit IV

Modules: Creating modules, import statement, from. Import statement, name spacing. **Error and Exceptions:** Difference between an error and Exception, Handling Exception, Try except block, Raising Exceptions, User defined exceptions. **File processing:** Reading and Writing Files- Creating a New File- Writing to a File- Reading Files as Text, Opening and Closing files, Reading and writing, tell (), seek(), rename ().

Unit V

Object Oriented Programming in Python: Classes, 'self-variable' Methods, Constructor Method, Inheritance, Overriding Methods, and Data hiding.

Graphical User Interfaces: The Behavior of Terminal Based Programs and GUI -Based, Programs, Coding Simple GUI-Based Programs, Other Useful GUI Resources.

Suggested Readings

1. Kenneth. A. Lambert, 2019. "Fundamentals of Python First Programs", 2nd Edition, Cengage.
2. Allen Downey, 2019. "Think Python", 2nd edition, Green Tea Press.
3. Vamsi Kurama, 2018. "Python Programming: A Modern Approach", 1st edition, Pearson Publishers.
4. Ashok Namdev Kamthane, Amith Ashok Kamthane, 2016. "Programming and Problem Solving with Python", 1st Edition, McGraw Hill Education.
5. W.J. Chun, 2013. "Core Python Programming", 3rd Edition, Pearson publishers.

Websites

1. https://www.programiz.com/python-programming
2. https://www.learnpython.org/
3. http://docs.python.org/3/tutorial/index.html
4. https://www.w3schools.com/python/python_try_except.asp
5. https://www.tutorialspoint.com/turtle-graphics-using-python

NPTEL

1. https://nptel.ac.in/noc/courses/noc22/SEM1/noc22-cs31/
2. https://nptel.ac.in/noc/courses/noc22/SEM1/noc22-cs32/
3. https://nptel.ac.in/noc/courses/noc22/SEM1/noc22-cs26/
4. https://nptel.ac.in/noc/courses/noc22/SEM1/noc22-cs08/

Semester-I

22CAP102 Computer Networks 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To become familiar with layered communication architectures (OSI and TCP/IP).
- To understand the client/server model and key application layer protocols.
- To learn sockets programming and how to implement client/server programs.
- To understand the concepts of reliable data transfer
- To learn about TCP and implement it.
- To learn the principles of routing and the semantics and syntax of IP.

Course Outcomes (COs)

Upon completion of this Course, student will be able to:

1. Analyze the terminology and concepts of the OSI reference model and the TCP-IPreference model.
2. Characterize the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks,
3. wireless networking concepts
4. To be familiar with contemporary issues in networking technologies
5. Understand the functionalities needed for data communication into layers
6. To understand the working principles of various application protocols and acquire knowledge about security issues and services available

Unit I – Introduction to Computer Network

Structure of the communications network - point-to-point and multidrop circuits - data flow and physical circuits –Various network topologies - topologies and design goals. The telephone network, switched and non-switched options - channel speed and bit rate - voice communicationsand analog waveforms - bandwidth and the frequency spectrum - connecting the analog and digital worlds - digital signals- the modem, asynchronous and synchronous transmission. Wide area and local networks, connection oriented and connectionless networks, classification of communications protocols, time division multiple access (TDMA), time division multiplexing (TDM), carrier sense (Collision) systems, and token passing systems.

Unit II – Layered Protocols & LAN

Layered Protocols and the OSI Model: Goals of Layered Protocols, network design problems" communication between layers- introduction to standard organizations and the OSI model - Layers of OSI.

Local Area Networks: Why LANs? Primary attributes of a LAN - Broadband and baseband and base LANs - IEEE LAN standards - connection options with LANs - LLC and MAC protocoldata units - LAN topologies and protocols. - token ring (Priority) - token bus and IEEE 802.4 - Metropolitan Area Networks (MANs) - ANSI fiber distributed data interface.

Unit III – Network Protocols

Network Protocols: TCP, UDP, IP, ICMP, SNMP, and RMON.**TCP/IP:** TCP/IP and internetworking - related protocols ports and sockets - The IP address structure - major features of IP - IP datagram - Major IP services -IP source routing -Value of the transport layer – TCP- Major features of TCP -Passive and active operation - the transmission control block (TCP) - route discovery protocols - application layer protocols.

Unit IV- Protocols

Polling/Selection Protocols: Character and bit protocols - binary synchronous control (BSC) HDLC - HOLC options - HDLC frame format - code transparency and synchronization -HDLC transmission process -HDLC subsets - SDLC Protocol conversion.

Switching and Routing in Networks: Message switching - packet switching -packet routing - packet switching support to circuit switching networks. Protocols in Application Layer TELNET, FTP, TFTP, NFS, SMTP:

The X.25 Network and Supporting Protocols: Features of X.25 - Layers of X.25 and the Physical layer and data link layer - Features of X.25 - X.25 channel options - flow control principles - X.25 logical channel states

Unit V – Network Security

Network Security: IP Security: Architecture, Authentication header -Encapsulating security payloads- combines security associations - key management.DNS spoofing, VLAN hopping.

Web Security: Secure socket layer and transport layer security - secure electronic transaction(SET). System Security: Intruders, Viruses and related threats - firewall design principles- trusted systems

Suggested Readings

1. B. Forouzan, Debdeep Mukhopadhyay, 2015. Cryptography and Network Security, TMH.
2. Michael A. Miller, 2008. “Data & Network Communications”, Vikas Publication.
3. Stallings. W, 2007. “Computer Communication Networks”,4th edition, Prentice Hall of India.
4. Tanneabaum. A.S, 2003. “Computer Networks”, 4th edition, Prentice Hall of India.

Websites

1. www.cs.vu.nl/~ast/CN5/
2. www.geeksforgeeks.org › computer-network-tutorials
3. www.tutorialspoint.com › data_communication_computer_network
4. www.computernetworkingnotes.com › networking-tutorials

NPTEL

1. https://nptel.ac.in/courses/106/105/106105183/
2. https://nptel.ac.in/courses/106105081/

Semester-I

22CAP103 Design and Analysis of Algorithms 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective

Enable the student

- To understand the linear and non-linear data structures available in solving problems
- Understand the concept of algorithms
- To know the basic mathematical functions.
- To know about the sorting and searching techniques and its efficiencies
- To get a clear idea about the various algorithm design techniques
- Using the algorithms in real time applications using different techniques.
- Able to analyze the efficiency of algorithm

Course Outcomes (Cos)

Upon completion of this Course, student will be able to:

1. Create efficient algorithm for a given problem
2. analyze its time complexity
3. Develop any new application with the help of algorithms techniques.
4. Apply the algorithm design techniques to any of the real-world problem.
5. Design own data structure according to the application need.
6. Apply the data structure to suit any given problem.

Unit I - Introduction

Introduction - Notion of Algorithm - Fundamentals of algorithmic problem solving - Important problem types - Fundamentals of the analysis of algorithm efficiency - analysis frame work - Asymptotic notations - Mathematical analysis for recursive and non-recursive algorithms.

Unit II - Divide and Conquer Method and Greedy Method

Divide and conquer methodology - Merge sort - Quick sort - Binary search - Binary tree traversal - Multiplication of large integers - Strassen's matrix multiplication – Greedy method- Prim's algorithm - Kruskal's algorithm - Dijkstra's algorithm.

Unit III - Dynamic Programming

Computing a binomial coefficient - Warshall's and Floyd' algorithm - Optimal binary searchtree - Knapsack problem - Memory functions.

Unit IV - Backtracking and Branch and Bound

Backtracking - N-Queens problem - Hamiltonian circuit problem - Subset sum problem - Branch and bound - Assignment problem - Knapsack problem Traveling salesman problem.

Unit V - Np- Hard and Np-Complete Problems

P & NP problems - NP-complete problems - Approximation algorithms for NP-hard problems - Traveling salesman problem - Knapsack problem.

Suggested Readings

1. S. Sridhar, 2014. "Design and Analysis of Algorithms", 1st edition, Oxford University Press.
2. Robert Sedgewick, Kevin Wayne, 2011. "Algorithm" 4th edition, Addison-Wesley Professional.
3. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, 2009. "Introduction to Algorithms", 3rd edition, PrenticeHall.
4. Anany Levitin, 2003. "Introduction to the Design and Analysis of Algorithms", Pearson Education.

Websites

1. https://www.gatevidyalay.com/algorithms/
2. http://www.vssut.ac.in/lecture_notes/lecture1428551222
3. https://lecturenotes.in/notes/17784-note-for-design-and-analysis-of-algorithm-daa-by-shekharesh- barik
4. https://aunotes.in/t/cs8451-design-and-analysis-of-algorithms-notes/939
5. https://www2.cs.duke.edu/courses/fall08/cps230/Book

NPTEL

1. https://nptel.ac.in/courses/106/105/106105184/
2. https://nptel.ac.in/courses/106105082/

Semester-I

22CAP104 Statistical Computing 4H - 3C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To define concepts of statistical measures, relationship between variables,
- To explain the hypothesis of statistical testing, theory of estimation
- To explain Statistical Quality Control methodologies
- To know about Correlation and Regression
- To know about statistical quality control
- To compute the statistical process

Course Outcomes (Cos)

Upon completion of this course, student will be able to:

1. To enter and manipulate data within SAS and R
2. To perform basic statistical analyses using SAS and R and interpret the output
3. To find information about Tools
4. To perform advanced statistical analyses using SAS and R, and then undertake such analyses.
5. Apply the concepts of modeling in R and SAS such as linear modelling or GLM
6. Estimate the statistics regarding the progress

Unit I – Introduction to Statistics

Statistical Measures: Introduction to descriptive Statistics-basic definitions, frequency distribution, Measure of Central Tendency: Mean Median and Mode. Measure of Dispersion: Absolute and relative measure of dispersion: Range, Mean deviation, Quartile deviation, Standard deviation and corresponding relative measures.

Unit II – Correlation and Regression

Correlation and Regression: Types of Correlation – Simple and Multiple, Positive and Negative, Linear and Non-Linear, Partial and Total. Methods of calculating correlation coefficient: Scatter diagram, Karl Pearson and Spearmen (Rank) correlation coefficient, Regression: Types, lines and equations, Linear Regression - least square method of solving regression equations, X on Y and Y on X.

Unit III - Hypothesis

Testing of Hypothesis: Introduction to Inferential Statistics: Null and alternative hypothesis, TypeI and Type II errors, Standard error, level of significance, acceptance and rejection regions and procedure for testing hypothesis. Large sample test - Z test - tests for means, variances and proportions, Small sample tests based on t, F and Chi- square distributions.

Unit IV - Estimations

Estimation and Design of Experiment: Point Estimation - characteristics of estimation - interval estimation -interval estimates of mean, standard deviation and proportion. Design of Experiments: Completely Randomized Design (CRD), Randomized Block Design (RBD) andLatin Square design (LSD) Models

Unit V - SQC

Statistical Quality Control (SQC): Statistical basis for control charts, control limits. Control chart R charts. Charts for defectives – p and np charts. Chart for defects – C chart for variable – X, Acceptance Sampling – Single and Double sampling plans.

Suggested Readings

1. T.Veerarajan, 2017. “Fundamentals of Mathematical Statistics”, Yesdee Publishing Pvt Ltd.
2. T N Srivastava and Shailaja Rego., 2012. “Statistics for Management”, McGraw Hill Education, New Delhi.
3. Steven K Thompson., 2012. “Sampling”, John Wiley and Sons inc.
4. Montgomery Douglas C., 2008. “Introduction to Quality Control”, Sixth Edition, John Wiley and Sons.
5. R.S.N.Pillai, Bagavathy, 2002. “Statistics”, S. Chand & Company Ltd, New Delhi.

Websites

1. https://www.stat.cmu.edu/~ryantibs/statcomp/
2. https://www.stat.cmu.edu/~cshalizi/statcomp/
3. https://www.r-project.org/

NPTEL

1. https://nptel.ac.in/courses/111105041/
2. https://nptel.ac.in/courses/111105077/
3. https://nptel.ac.in/courses/111104120/
4. https://nptel.ac.in/resources/statistics/

Semester-I

22CAP105 Organizational Behaviour 4H - 3C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To understand the basic concepts of organizational behavior.
- To analyze the individual behavior traits required for performing as an individual or group.
- To obtain the perceiving skills to judge the situation and communicate the thoughts and ideas.
- To understand how to perform in group and team and how to manage the power, politics and conflict.
- To recognize the importance of organizational culture and organizational change.
- To realize the importance of groups and teamwork and managing of conflict between the members of the organization

Course Outcomes (Cos)

Upon completion of this course, the student will have reliably demonstrated the ability to:

1. Analyze organizational behavior issues in the context of the organizational behavior theories and concepts.
2. Assess the behavior of the individuals and groups in organization and manage the stress.
3. Manage team, power, politics and conflict arising between the members.
4. Explain how organizational change and culture affect the working relationship within organizations.
5. Understand and exhibit the communication skills to convey the thoughts and ideas of case analysis to the individuals and group.
6. Understand the application of OB using appropriate concepts, logic and theoretical conventions

Unit I - Organization Behaviour : Introduction

Organization Behavior: Meaning and definition - Fundamental concepts of Organization Behavior - Contributing disciplines to the Organization Behavior field – Organization Behavior Model - Significance of Organization Behavior in the organization success - Challenges and Opportunities for Organization Behavior.

Unit II - Behaviour, Personality and Learning Theories

Attitudes – Sources - Types - Functions of Attitudes – Attitude and Job satisfaction, Emotions and Moods – Emotional Intelligence – Organization Behavior Applications of Emotions and Moods, Learning – Theories of Learning. Personality – Determinants of personality- Theories of Personality - psycho-analytical, social learning, job-fit, and trait theories. Values – Importance - Types of Values – Linking Individual personality and values to the work place.

Unit III - Perception And Communication

Perception – factors influencing perception - Person Perception – Attribution Theory – Frequently Used Shortcuts in Judging Others- Perceptual Process- Perceptual Selectivity - Organization Errors of perception – Linkage between perception and Decision making.

Communication – Process – Directions of communication – interpersonal and organizational communication – Barriers to effective communication – Leadership - Styles – Theories.

Unit IV - Group, Team, Power politics and Conflict

Foundation of Group Behavior - Concept of Group - Types of Groups - Stages of Group Development - Group Norms - Group Cohesiveness – Group Decision making – Understanding working teams – types of teams- creating effective teams- Turning individuals to team players.

Power and Politics - Bases of Power – Power tactics. Conflict – Meaning –Transition in conflict thoughts- Conflict Process- Negotiation.

Unit V - Organization Culture, Change and Stress Management

Organizational culture- Definitions and Characteristics of Culture- Types of Culture – Creating and Maintaining an Organizational Culture. Organizational change –Meaning- Forces for Change- Managing Planned Change - Factors in Organizational Change - Resistance to change- Overcoming resistance to change. Stress – Causes of stress – Effects of Occupational Stress- Coping Strategies for Stress.

Suggested Readings

1. Fred Luthans, 2017. Organizational Behavior: An Evidence - Based Approach, 12thedition, Mcgraw Hill Education, New Delhi.
2. Steven Mcshane and Mary Ann VonGlinow, 2017. Organizational Behavior, 6th edition, McGraw Hill Education, New Delhi
3. Robbins, S. P., and Judge, T.A., 2016. Organizational Behaviour.(16thedition).New Delhi: Prentice Hall of India.
4. Laurie J. Mullins, 2016. Management and Organizational behavior, 10thedition, Pearson Education, New Delhi
5. Robbins, S. P., and Judge, T.A., 2016. Essentials of Organizational Behavior.13thedition, Pearson Education.

NPTEL

1. https://nptel.ac.in/courses/110/105/110105033/

Semester-I

22CAP111 Python Programming- Practical 5H -2C

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To create the basic python programming using expressions and operators
- To understand the fundamental principles of Object-Oriented Programming
- To know about the data and information processing techniques.
- To define the python functions to facilitate code reusability
- To explain the concepts of string processing, file I/O, lists and dictionary
- To create GUI based python applications using Object oriented programming

Course Outcomes (COs)

Upon completion of this course, student will be able to:

1. Apply modules for reusability and the object-oriented principles for modeling and developing software system.
2. Explore and solve real-world software development challenges
3. Analyze the concept of string and text files using python programming.
4. Construct applications with graphical user interface.
5. Develop software solutions using multi-threading
6. Design and develop the networking concepts.

List of Programs:

1. Write a python program using Control statements
2. Write a python program using Functions and String Operations
3. Write a python program using List, Tuples and List comprehensions
4. Write a python program using Inheritance
5. Write a python program using Synchronization
6. Write a python program using Text Files
7. Write a python program using Graphical user Interfaces
8. Write a python program using Exceptional Handling
9. Write a python program using Classes and Objects
10. Write a python program using Chat Applications

Websites

1. www.python.org/about/gettingstarted/
2. www.tutorialspoint.com/python/index.htm
3. www.realpython.com/python-beginner-tips/

NPTEL

1. https://nptel.ac.in/courses/106/106/106106182/
2. https://nptel.ac.in/courses/106106145/

Semester-I

22CAP112 Computer Networks – Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To become familiar with layered communication architectures (OSI and TCP/IP).
- To understand the client/server model and key application layer protocols.
- To learn sockets programming and how to implement client/server programs.
- To understand the concepts of reliable data transfer
- To learn about TCP and implement it.
- To learn the principles of routing and the semantics and syntax of IP.

Course Outcomes (COs)

Upon completion of this Course, student will be able to:

1. Analyze the terminology and concepts of the OSI reference model and the TCP-IPreference model.
2. Characterize the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks, wireless networking concepts.
3. To be familiar with contemporary issues in networking technologies
4. Understand the functionalities needed for data communication into layers
5. To understand the working principles of various application protocols and acquire knowledge about security issues and services available

List of Programs

1. Write a networking program in Java to implement a TCP server that provides services fora TCP Client.
2. Write a networking program to implement socket programming using User datagram Protocol in Java.
3. Implement an FTP server using socket programming.
4. Implement a chat server using socket programming.
5. Implement an ECHO server using socket programming.
6. Implement Address Resolution Protocol using socket programming.
7. Implement Ping server and Ping client using socket programming.
8. Using UDP to transfer a text file from one host to another.
9. Implement Remote Command Execution using network programming.
10. Simulate simple Web Browser.
11. Write a Java program to check whether the given DNS is found in the internet or not.
12. Write a network program using HTTP to print the document for the given URL.

Suggested Readings

1. B. Forouzan, Debdeep Mukhopadhyay, 2015. Cryptography and Network Security, TMH
2. Stallings. W, 2007. Computer Communication Networks, 4th edition, Prentice Hall of India.
3. Tenenbaum. A.S, 2003. Computer Networks, 4th edition, Prentice Hall of India.

Websites

1. www.cs.vu.nl/~ast/CN5/
2. www.geeksforgeeks.org › computer-network-tutorials
3. www.tutorialspoint.com › data_communication_computer_network

Semester-I

22CAP113 Design and Analysis of Algorithms – Practical 4H -2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives:

Enable the student to

- Understand the basics of programming concepts.
- Understand the concept of algorithms and mathematical functions.
- To know about the sorting and searching techniques and its efficiencies
- To get a clear idea about the various algorithm design techniques
- Using the algorithms in real time applications using different techniques.
- Able to analyze the efficiency of algorithm

Course Outcomes (COs):

The student will be able to

1. Describe the divide and Conquer technique.
2. Understand the different types of algorithms techniques.
3. Interpret C programming language to solve mathematical problems
4. Design an algorithmic solution to tree and graph
5. Build the interactive programs for backtracking problems
6. Understand the high-performance programs designed an algorithm to build up the real proficiency.

List of Programs:

1. Apply the divide and Conquer technique to arrange a set of numbers using merge sort method.
2. Perform Strassen's matrix multiplication using divide and conquer method.
3. Solve the knapsack problem using greedy method.
4. Construct a minimum spanning tree using greedy method.
5. Construct optimal binary search trees using dynamic programming method of problem solving.
6. Find the solution for traveling salesperson problem using dynamic programming approach.
7. Perform graph traversals.
8. Implement the 8-Queens Problem using backtracking.
9. Implement knapsack problem using backtracking.
10. Find the solution of traveling salesperson problem using branch and bound technique.

Suggested Readings

1. S. Sridhar, 2014. "Design and Analysis of Algorithms", 1st edition, Oxford University Press.

Websites

1. https://lecturenotes.in/practicals/13551-lab-manual-for-design-and-analysis-of-algorithms-daa-by-nihar-ranjan-rout
2. https://iare.ac.in/sites/default/files/lab1/II%20YEAR_DAA_LAB_MANUAL
3. http://camelliait.ac.in/Lab%20Manual/ADA%20Lab%20Programs

Semester-II

22CAP201 J2EE 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To understand J2EE as an architecture and platform for building
- To deploy web-based, n-tier, transactional, component-based enterprise applications
- To understand the fundamental concepts of XML and related technologies
- To acquire knowledge on how XML is currently being used in various application areas
- To know how to parse and transform XML documents via tools and through programming APIs
- To understand the EJB architecture and have a good grasp on when to use and how to use various EJB bean types and acquire relevant Java programming experience

Course Outcomes (COs)

Upon completion of this course, Students will be able to:

1. Characterize the concepts J2SE and J2EE
2. Develop Enterprise Applications using Session Bean, Entity Bean and MDB
3. Demonstrate the hierarchy of Java classes to provide software solutions using Java APIs
4. Analyze the components and patterns of Java Servlet architecture for web applications
5. Apply systematic Java programming knowledge to connect backend and front end
6. Implement the Java Servlet to transfer data

Unit I – J2EE Overview

J2EE Overview – Beginning of Java – Java Byte code – Advantages of Java –J2EE and J2SE. J2EE Multi Tier Architecture – Distributive Systems – The Tier – Multi Tier Architecture – ClientTier, Web Tier, Enterprise Java Beans Tier, Enterprise Information Systems Tier Implementation.

Unit II - J2EE Database Concepts

J2EE Database Concepts: Data – Database – Database Schema. JDBC Objects: Driver Types – Packages – JDBC Process – Database Connection – Statement Objects – Result Set – Meta Data.

Unit III - Java Servlets

Java Servlets: Benefits – Anatomy – Reading Data from Client –Reading HTTP RequestHeaders – Sending Data to client – Working with Cookies.

Unit IV – Enterprise Java Beans

Enterprise Java Beans – Deployment Descriptors – Session Java Bean –Entity Java Bean – Message Driven Bean.

Unit V – Java Server Pages

Java Server Pages – The life cycle of a JSP – using objects within JSP pages – Literals and Operators - Custom Tags in JSP pages – JSP scripting elements and directives - Reserved words- Java Remote Method Invocation.

Suggested Readings

1. Jim Keogh, 2017. The Complete Reference J2EE, 1st Edition, Tata Mc Graw Hill Edition, New Delhi.
2. Tarun Singh, 2016. Java/J2EE, PHP, JSF, JSP, Servlet, Spring 4.0, Spring Boot 1.5, Hibernate 5.0, Bootstrap, HTML5, CSS3 and XML.
3. Rod Johnson, 2004. J2EE Development without EJB, 1st Edition, Wiley Dream TechIndia, New Delhi.
4. Rod Johnson, 2004. Expert One-On-One J2ee Design and Development, John Wiley &Sons, Incorporated.
5. Paul J Perrone, Venkata S R RChaganti, S .R.Venkata Krishna, R Chaganti and Tom Schwenk, 2003. J2EE Developer's Handbook, Sams Publications.
6. Joseph J Bambaraetal, 2001. J2EE Unleashed, 1st Edition, Tech Media.

Websites

1. java.sun.com/javaee/
2. java.sun.com/j2ee/1.4/docs/tutorial/doc/
3. www.j2eebrain.com/
4. http://www.codejava.net/java-se/jdbc/connect-to-oracle-database-via-jdbc
5. http://mrbool.com/how-to-create-rmi-client-and-server-to-invoke-remove-method-of- rmi-server-in-java/28320
6. https://freevideolectures.com/course/3616/java-j2ee-and-soa

NPTEL

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://www.nptelvideos.com/java/

Semester-II

22CAP202 Mobile Computing 4H - 3C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course Objectives

Enable the student

- To define the concepts and technology of wireless communication in mobile computing fielding.
- To describe the principles of networking that support connectivity to cellular networks, wireless internet and sensor devices.
- To explain the techniques involved in the functioning of Mobile Adhoc Networks
- To know the techniques involved in Vehicular Adhoc Networks.
- To examine the characteristics, techniques and technology of 1G,2G,3G and 4G
- To demonstrate the features of Android Mobile Operating System for developing Android Applications

Course Outcomes (COs)

Upon completion of this course, Students will be able to:

1. Analyze the architecture, merits and demerits of Wireless technologies like Infra Red,blue tooth, Wi-Fi, RFID and Wi-Max .
2. Characterize the principles of mobile technologies like GPRS, GSM,CDMA, and TDMA
3. Compare the characteristics and techniques MANET with VANET
4. Analyze technology of 1G,2G,3G and 4G for gaining the working knowledge of four generation wireless technologies.
5. Apply the features of Android programming for developing Android Applications
6. Identify the features involved in Bluetooth technology.

Unit I - Introduction

Mobile Computing- Middleware and Gateways-Developing Mobile Computing Applications-Security in Mobile Computing – Architecture of Mobile Computing-Three-Tier Architecture-Design Consideration for Mobile Computing-Mobile Computing through Internet- Mobile Computing through Telephone-Developing an IVR Applications

Unit II – Bluetooth and GSM

Bluetooth- Features and working of RFID -Wireless Broadband (WiMax)- Mobile IP – IPV6- IPV4 Vs IPV6 –Global System for Mobile Communications – GSM Architecture – Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocation – Authentication and Security- Mobile Computing Over SMS – SMS- Value Added Services through SMS.

Unit III – GPRS,3G and 4G Networks

GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS- Applications for GPRS – Limitations of GPRS- Spread Spectrum Technology-CDMA Versus GSM – – Features of 3G Networks –Architecture of 3G- Applications of 3G - Features of 4G- Architecture of 4G - Wireless Technologies Used in 4G- Merits and Demerits of 4G

Unit IV – Mobile Ad-hoc Networks

MOBILE Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc Networks (VANET) – MANET Vs VANET – Security of VANET and MANET

Unit V – Android Operating System

History of Android -Introduction to Android Operating Systems -Android Architecture - Android Virtual Device Manager - Features of Eclipse and Android Studio-Comparison of Kotlin Language to Java-User Interface Architecture of Android: Application context, intents, Activity lifecycle, User Interface Design of Android –Features of Android SQLite Database

Suggested Readings

1. Peter Spath, 2019. “Learn Kotlin for Android Development”, A Press Publications
2. Asoke K. Talukder, Hasan Ahmed, Roopa R Yavagal, 2017. “Mobile Computing: technology,applications, and service creation”, Tata McGraw Hill, New Delhi.
3. Sunilkumar S. Manvi , Mahabaleshwar S. Kakkasageri,2016. “Wireless and Mobile Networks,Concepts and Protocols”, Wiley Publications.
4. Stefano Basagni , Marco Conti , Silvia Giordano , Ivan IvanStojmenovic,2015. “ Mobile AdHoc Networking, The Cutting-Edge Directions”, Wiley Publications.
5. James C.Sheusi, 2013. “Android application development for Java programmers, Cengage Learning”.
6. Charles E.Perkins, 2008. “Ad Hoc Networking”, Addison-Wesley Publications

Websites

1. en.wikipedia.org/wiki/Mobile computing
2. www.cse.iitk.ac.in/users/rkg/Talks/mobile_main.pdf
3. www.tutorialspoint.com/android/
4. pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf

NPTEL

1. https://swayam.gov.in/nd1_noc19_ee48/preview

LMS

1. http://172.16.25.76/course/view.php?id=2224

Semester-II

22CAP203 Artificial Intelligence 4H–3C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal:40 External:60 Total: 100

End Semester Exam :3 Hours

Course Objectives:

Enable the student

- To define the problem-solving methods of Artificial Intelligence.
- To describe the various knowledge representation strategies in AI
- To demonstrate the knowledge inference methodologies of AI
- To examine the various Machine learning models and algorithms.
- To explain the role of expert systems in IT field
- To know the various expert system

Course Outcomes:

Upon Completion of this course, the student will be able to:

1. Analyze the problem-solving strategies of AI
2. Apply the knowledge representation methods using Prolog or Visual Prolog
3. Compare the knowledge inference methods of AI
4. Characterize the machine learning tasks and machine learning types
5. Apply the expert system methods for developing AI based expert systems
6. Know the architecture of Expert system

Unit I - Problem Solving and AI

Introduction to AI-Problem formulation, Problem Definition -–Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing – Heuristic programming – Depth first and Breath first- Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms- state space representations – graph notations

Unit II - Representation of Knowledge

Game playing – Puzzles and Games- Knowledge representation using Predicate logic- Knowledge representation using other logic-Structured representation of knowledge- Introduction to predicate calculus - Use of predicate calculus- Features of Prolog and VisualProlog Language

Unit III - Knowledge Inference

Knowledge representation -Production based system, Frame based system. Inference – Backward chaining- Forward chaining - Rule based System-– Certainty factors-BayesianTheory-Bayesian Networks -Dempster Shafer theory. – Fuzzy Logic-Fuzzy Sets-Fuzzy Inference-Applications of Fuzzy Logic.

Unit IV - Planning and Machine Learning

Basic plan generation systems – Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, why not and how explanations. Learning- Machine learning- Machine Learning tasks- Types of machine learning algorithms – Machine Learning models

Unit V - Expert Systems

Expert systems – Architecture of expert systems- Roles of expert systems – Knowledge engineering: knowledge representation techniques – knowledge acquisition – acquiring knowledge from experts – automating knowledge acquisition –Building an expert system – difficulties in developing an expert system -Typical expert systems – MYCIN, DART, XOON, Expert systems shells

Suggested Readings

1. Kevin Night and Elaine Rich, Nair B., 2017. "Artificial Intelligence (SIE)", Mc Graw Hill.
2. Flasiński, Mariusz. 2016. "Introduction to Artificial Intelligence", Tata Mcgraw Hill, Delhi.
3. Chandra. S.S.V, 2014. "Artificial Intelligence and Machine Learning", Kindle Edition.
4. Dr.R.P.Das, 2012, "Neural Networks and Fuzzy Logic", 1st Edition, Tata Mcgraw Hill, Delhi
5. Dan W. Patterson, 2007. "Introduction to AI and ES", Pearson Education.

Websites

1. https://www.tutorialspoint.com › Artificial Intelligence
2. www-formal.stanford.edu/jmc/whatisai/node3.html
3. https://swayam.gov.in/nd1_noc19_me71/preview
4. https://swayam.gov.in/nd1_noc20_cs30/preview

Semester-II

22CAP204D Database Administration 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective

Enable the student

- To install and configure database
- To create users and assign roles
- To optimize schemas, tables, indexes and views
- To manage database services and clients
- To move the data from one database to another database.
- To take backup and perform recovery.

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Design, model and install any database management systems by using Oracle database as sample.
2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance
3. Define and devise transaction management, concurrency control, crash recovery components
4. Examine and perform data base administration roles
5. Examine the database operations by using Oracle database system as a sample.
6. Apply the knowledge of VLDB to control the distributed databases

Unit I - Introduction to Oracle DBA

Oracle DBA's: The Oracle DBA's Role- Oracle Database 10g Architecture: Oracle Databases and instances- Oracle Logical Storage structures – Oracle Logical Database structures – Oracle Physical Storage structures- Multiplexing Database Files - Oracle Memory Structures-Oracle Backup and Recovery – Security Capabilities – Tablespace Architecture – Oracle Tablespace installation – Traditional Disk Space Storage – Automatic Storage Management.

Unit II – Introduction to Space Management

Common Space Management Problems – Oracle Segments, Extents and Blocks – Space Management Methodologies – SYSAUX monitoring and usage – Archived Redo Log File Management – Built in Space Management Tools: Segment Advisor – Undo Advisor and the Automatic Workload Repository – Index usage – Space Usage Warning Levels – Reusable space allocation – Managing alert and Trace Files with ADR – Transaction Basics – Undo Basics – Managing Undo Tablespaces – Flashback features.

Unit III – Introduction to Tuning Application

Tuning Application Design – Tuning SQL – Tuning Memory Usage – Tuning Data Access – Tuning Data Manipulation – Tuning Physical Storage – Reducing Network Security – Database Authentication Methods.

Unit IV – Authorization Methods

Database Authorization Methods – Auditing: Auditing Locations – Statement Auditing – Privilege Auditing Schema Object Auditing – Auditing Related Data Dictionary Views – LogicalBackups – Physical Backups – Using Data Pump Export and Import – Data Pump Import Options -– Integration of Backup Procedures.

Overview of Oracle Net – Using the Oracle Net Configuration Assistant – Using the Oracle Net Manager – Starting the Listener Server Process – Controlling the Listener Server Process UsingData links.

Unit-V - Creating Table Spaces in a Vldb Environment

Creating Tablespaces in a VLDB Environment: Big file Tablespace Basics – Creating and Modifying Big file Tablespace – Big file Tablespace ROWID format – DBMS_ROWID and Bigfile Tablespaces- Advanced Oracle Table Types – Using Bitmap Indexes – Oracle Data PumpRemote queries – Remote Data Manipulation: Two Phase Commit – Managing DistributedData – Managing Distributed Transactions – Monitoring and Tuning Distributed Database.

Suggested Readings

1. Amarnath Reddy, 2018. “Oracle DBA 11g/12c – Database Administration for junior DBA”.
2. Saikat Basak, 2010. “Oracle DBA Concise Handbook”, Ensel Software.
3. Bob Bryla, Kevin Loney, 2008. “Oracle Database 11g DBA Handbook”, McGraw-Hill Osborne.

Websites

1. www.oracle.com/technology/software/products/database/oracle10g/index.html
2. www.oracle-base.com/articles/10g/
3. www.adp-gmbh.ch/ora/misc/10g.html

NPTEL

1. https://nptel.ac.in/courses/106105175/
2. https://nptel.ac.in/courses/106105175/

Semester-II

22CAP204N Cryptography and Network Security 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal: **40**External: **60**Total: **100**

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To teach fundamental aspects of security in a modern networked environment with the focus on system design aspects and cryptography in the specific context of network.
- To build protection mechanisms in order to secure computer networks.
- To write coding to encrypt "Plain Text" into "Cipher Text" and vice versa, using different encryption algorithms.
- To choose a suitable ciphering algorithm according to the required security level.
- To build cryptosystems by applying encryption algorithms.
- To build secure authentication systems by use of message authentication techniques.
- To know about the blockchain technology.

Course Outcomes (Cos)

Upon completion of this course, students will be able to:

1. Classify the symmetric encryption techniques
2. Illustrate various public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Demonstrate the basic concepts of system level security
6. Apply the block chain technology for security

Unit I- Introduction to Cryptography

Introduction to Cryptography – Security Attacks – Security Services – Security Algorithm – Stream cipher and Block cipher – Symmetric and Asymmetric – Key Cryptosystem; Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.

Unit II- Public Key Cryptosystem

Public Key Cryptosystem: Introduction to Number Theory – RSA Algorithm – Key Management – Diffie-Hell man key exchange – Introduction to Elliptic Curve Cryptography; Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

Unit III - Network Security Practice

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication Services and Encryption Techniques: E-mail security – PGP – s/MIME – IP Security.

Unit IV - Web Security and Cryptographic Algorithms, Security and Steganography

Web Security – Secure Socket Layer – Secure Electronic Transaction; System Security – Intruders and Viruses – Firewalls – Password Security. Case Study: Implementation of Cryptographic Algorithms – RSA – DSA – ECC (C / JAVA Programming). Network Forensic –Security Audit; Other Security Mechanism: Introduction to Stenography – Quantum Cryptography – Water Marking – DNA Cryptography.

Unit V – Basics of Blockchain Technology

Distributed Database, Two General Problem, Byzantine General Problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, and Zero Knowledge Proof.

Suggested Readings

1. William Stallings, 2013. "Cryptography and Network Security", 6th Edition. Pearson Education, New Delhi.
2. A. Menezes, P. Van Oorschot and Vanstone, 2010. "Hand Book of Applied Cryptography", 2ndEdition. CRC Press, New Delhi.
3. Ankit Fadia, 2010. "Network Security", 2nd Edition. McMillan India Ltd, New Delhi.
4. Bruce Schneir, 2006. "Applied Cryptography", 2nd Edition. CRC Press, New Delhi.

Websites

1. williamstallings.com/Crypto3e.html
2. u.cs.biu.ac.il/~herzbea/book.html
3. www.flipkart.com/search-books/cryptography+and+network+security+William+ stallings+ebook

NPTEL

1. https://nptel.ac.in/courses/106105162/
2. https://swayam.gov.in/nd1_noc20_cs21/preview

Semester-II

22CAP204S Software Testing and Quality Assurance 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal: **40** External: **60** Total: **100**

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To perform test each time they are run, thereby eliminating human error.
- To test how the software reacts under repeated execution of the same operations.
- To program sophisticated tests which bring out hidden information from the application.
- To reuse tests on different versions of an application, even if the user interfaces changes.
- To know the risks in project management system
- To know about various testing

Course Outcomes (COs)

Upon completion of this course, students will be able to

1. Test the software by applying testing techniques to deliver a product free from bugs
2. Evaluate the web applications using bug tracking tools.
3. Investigate the scenario and the able to select the proper testing technique
4. Explore the test automation concepts and tools
5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma
6. Evaluate the estimation of cost, schedule based on standard metrics

Unit I – Introduction to Testing

Introduction: Purpose of Testing – Dichotomies - Model for Testing – consequences of bugs-Taxonomy for bugs

Unit II – Flow Graphs and Path Testing

Flow/Graphs and Path Testing: Path testing basics-predicates, path predicates and Achievable paths – Path sensitizing– path instrumentation-implementation and application of path testing

Unit III - Introduction to Flow Testing

Transaction flow testing: – Transaction flow - Transaction flow testing techniques – implementation comments – testability tips -Data flow testing basics-Data flow testing strategies.

Unit IV – Domains and Paths

Domains and paths-Nice Domains and Ugly Domains-Domain Testing-Domains and interface testing-Domains and testability-Metrics-Linguistic metrics-structural metrics-Hybrid metrics-metrics implementations-Testability tips

Unit V – Risk Analysis

Risk Analysis: Benefits of Risk analysis – Project Management Strategies and Risk – MITs risk Analysis – MITs Ranking Criteria - Using Risk Ranking in Forensics –Test estimation process- MIT totals worksheet-Sizing worksheet

Suggested Readings

1. Dorothy Graham,Rex Black, and et.al , 2011. "Foundations of Software Testing - ISTQB Certification", 3rd Edition, Cengage Learning.
2. R.Rajani, and P.P.Oak, 2004. "Software Testing", Tata Mcgraw Hill, New Delhi.
3. Boris Beizer, 2003. "Software Testing Techniques", II Edition., Dream Tech India, New Delhi. (UNIT – I, II, III, IV)
4. Marnie L Hutcheson, 2003. "Software testing fundamentals", 1st Edison, Wiley, DreamTech India, New Delhi. (UNIT – V)
5. Burnstein, 2003. "Practical Software Testing", Springer International Edison.

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1. http://my.safaribooksonline.com
2. http://www2.sas.com
3. http://www.softwaretesting fundamentals.com
4. www.cs.cmu.edu
5. www.softwaretesting management.con
6. http://www.java2novice.com/junit-examples/test-list-objects/

NPTEL

1. https://swayam.gov.in/ndl_noc19_cs71/preview
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117106112

Semester-II

22CAP204W	**Angular JS**	**4H - 4C**

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks: Internal: 40 External: 60 Total: 100**

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To utilize AngularJS formats adequately
- To make the perplexing structures quickly
- To confine web applications to take into account worldwide groups of onlookers
- To make Secured web application s from dangers and pernicious clients
- To understand the compiler for building better and more propelled orders
- To organize the web application utilizing the vigorous index structure

Course Outcomes (Cos)

Upon successful completion of this course, students will be able to:

1. To apply an AngularJS Single Page Application from scratch
2. To build an awesome User Interface
3. To create and bind controllers with JavaScript
4. To separate the model, view, and controller layers of your application and implement them using AngularJS
5. To integrate and enhance Angular applications with other useful JavaScript libraries such as Node.js
6. Test the application using AngularJS

Unit I - Introducing AngularJS

Introducing AngularJS- Starting Out with AngularJS. **Basic AngularJS Directives and Controllers:** AngularJS Modules - Creating Our First Controller - Working with and Displaying Arrays - More Directives - Working with ng-repeat.

Unit II -Unit Testing in AngularJS

Unit Testing: What and Why? - Introduction to Karma - Jasmine: Spec Style of Testing - Writinga Unit Test for Our Controller - Running the Unit Test.

Forms, Inputs, and Services: Working with ng-model - Working with Forms - Leverage Data-Binding and Models - Form Validation and States - Error Handling with Forms - Nested Forms with ng-form - Other Form Controls.

Unit III - All About AngularJS Services

AngularJS Services - Creating Our Own AngularJS**. Server Communication Using $http:** Fetching Data with $http Using GET - Advanced $http.

Unit IV - Unit Testing Services and XHRs

Dependency Injection in Our Unit Tests - Unit Testing Server Calls. **Working with Filters:** What Are AngularJS Filters? - Creating AngularJS Filters - Things to Remember About Filters.**Unit Testing Filters:** The Filter under Test - Testing the time filter. **Routing Using ng Route:** Routing in a Single-Page Application - Using Route - Routing Options - Additional Configuration. Additional tools for testing AngularJS applications Karma, Jasmine, angular-mocks.

Unit V – Directives

Alternatives to Custom Directives - Understanding the Basic Options**. Unit Testing Directives:** Steps Involved in Testing a Directive - The Stock Widget Directive- Setting up Our Directive Unit Test - Other Considerations& Testing Directives. **Advanced Directives:** Life Cycles in AngularJS - Directive Controllers and require - Priority and Terminal - Third-Party Integration -Best Practices.

End-to-End Testing: The Need for Protractor - Initial Setup - Protractor Configuration - An End-to-End Test - Considerations. Guidelines and Best Practices: Testing - Project Structure - Build - Best Practices - Tools and Libraries

Suggested Readings

1. Chandermani Arora, Kevin Hennessy, 2018. “Angular 6 by Example: Get up and running with Angular by building modern real-world web apps”, 3rd Edition, Kindle Edition.
2. Agus Kurniawan, 2014. “AngularJS Programming by Example”, First Edition
3. Adam Freeman, 2014. “Pro AngularJS “, First Edition, Apress.
4. Brad Green and Shyam Seshadri, 2013. “Angular JS”, First edition, O'Reilly Publications.

Websites

1. http://www.w3schools.com/angular/default.asp
2. http://www.tutorialspoint.com/angularjs/
3. https://www.tutorialspoint.com/angularjs/angularjs_tutorial.pdf [E-book for AngularJS]
4. https://www.edx.org/course/angularjs-framework-fundamentals

NPTEL

1. https://nptel.ac.in/courses/106/106/106106147/

Semester-II

22CAP204DS Foundations of Data Science 4H -4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To study the basic concepts of Data Science and data lifecycle.
- To understand the theoretical and mathematical aspects of Data Science models.
- To learn common random variables and their uses, and with the use of empirical distributions.
- To obtain the knowledge in data management tools.
- To explore the major techniques for data science.

Course Outcomes (Cos)

Upon successful completion of this course, students will be able to:

1. Understand the key concepts in data science, including tools and approaches.
2. Understand the concepts in data collection, sampling and probabilistic models.
3. Understand the various techniques in data science
4. Apply the mathematical formulation of machine learning and statistical models to
5. visualize the data in various methods.
6. Apply a suitable data science technique to solve an information analytics problem.

Unit I- Introduction

The Big Picture: What is Data Science? –The data life cycle: pre-processing, analysis, post-processing–Preprocessing: Data gathering, cleansing, visualization, and understanding (Mean, Variance, Standard Deviation. Percentiles.)–Data Storage (Relational databases, e.g. MySQL)

Unit II- Sampling

Sampling – Probability Models for Statistical Methods: Discrete and continuous probability distributions, density functions. Random variables, expected values, variance, correlation.

Unit III- Data Normalization

Data Normalization (z-values, transforms) –Random processes –Data Management: Tools for Data Analysis, Case Study: Data analysis using Python-Arrays, Visualization.

Unit IV- Major Techniques in Data Science

Major Techniques in Data Science: Data mining, Data warehousing, Data mining vs Data warehouse–Machine Learning-Supervised Learning, Unsupervised Learning.

Unit V- Business Intelligence

Business Intelligence–Descriptive Analytics, Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics–Cloud computing-definition, Cloud services, types of clouds, some of commercial and non-commercial cloud service providers.

Suggested Readings

1. Saltz Jeffrey S, 2019. "An Introduction to Data Science", Second Edition, Sage Publications Inc,
2. Peter Bruce & Andrew Bruce, 2017. "Practical Statistics for Data Scientists", First Edition, O'Reilly Publication
3. Murtaza Haider, 2015. "Getting Started with Data Science: Making Sense of Data with Analytics", IBM Press, First Edition
4. Glenn J. Myatt, Wayne P. Johnson, 2014. "Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining", Second Edition, John Wiley & Son Publication,
5. Dawn Griffiths, 2008. "Head First Statistics", First Edition, O'Reilly Publication.

Websites

1. https://www.inferentialthinking.com/chapters/intro
2. https://www.openintro.org/stat/
3. https://swayam.gov.in/nd1_noc20_cs36/preview
4. https://swayam.gov.in/nd1_noc19_cs60/preview
5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/

Semester-II

22CAP205D Distributed Database Management System 4H -4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To design good performing distributed database schemas.
- To create optimized query execution plan.
- To efficiently distribute and manage the data.
- To manage distributed access control
- To know how to make secure the databases.
- To know about query optimization

Course Outcomes (Cos)

Upon completion of this course, students will be able to

1. Analyze the physical structure of the database to handle data
2. Apply the knowledge of design alternatives and fragmentation for data distribution
3. Demonstrate the concept of normalization of the database
4. Characterize the concepts of deadlock handling in real time transactions of database
5. Apply the knowledge of database security for protecting data security
6. Handle the deadlock in the database operation

Unit I – Introduction to Database Concepts

Database concepts: Data Models- Database Operations- Database Management-DB Clients, Servers, and Environments. DBE Architecture**:** Services- Components and Subsystems- Sites - Expected Services-Expected Subsystems- Typical DBMS Services**–** DBE Taxonomy**:** COS Distribution and Deployment- COS Closeness or Openness-Schema and Data Visibility- Schemaand Data Control.

Unit II – Design Alternatives and Fragmentation

Data Distribution Alternatives: Design Alternatives- Localized Data- Distributed Data. Fragmentation: Vertical Fragmentation- Horizontal Fragmentation. Distribution Transparency: Location Transparency-Fragmentation Transparency-Replication Transparency-Location, Fragmentation, and Replication Transparencies.

Unit III - Query Optimization

Query Optimization: Sample Database- Query Processing in Centralized Systems: QueryParsing and Translation - Query Optimization- Query Processing in Distributed Systems-Heterogeneous Database Systems - Concurrency Control in Distributed Database Systems.

Unit IV - Deadlock Handling

Deadlock Handling: Deadlock Definition- Deadlocks in Centralized Systems- Deadlocks in Distributed Systems- Distributed Deadlock Detection. Replication Control: Replication Control Scenarios. Failure and Commit Protocols: Terminology- Commit Protocols.

Unit V - DDBE Security

DDBE Security: Cryptography- Securing Data. Traditional DDBE Architectures: Classifying the Traditional DDBMS Architecture- The MDBS Architecture Classifications- Approaches for Developing A DDBE- Deployment of DDBE Software.

Suggested Readings

1. Saeed K. Rahimi And Frank S. Haug, 2010. "Distributed Database Management Systems : A Practical Approach", 1st Edition, A John Wiley & Sons, Inc., Publication.
2. Tamer OzusM,PatrickValduriez,S.Sridhar, 2006. "Principle Of Distributed Database Systems", 1st Edition , Pearson Education.
3. William M.NewMan, RobortF.Sproull, 2004. "Principles of Interactive Computer Graphics", 1st Edition , Pearson Education.

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2. www.webopedia.com/TERM/D/distributed_computing.html
3. www.tech-faq.com/distributed-computing.shtml
4. http://www.inf.unibz.it/dis/teaching/DDB/ln/ddb01.pdf

NPTEL

1. https://nptel.ac.in/courses/106105175/
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106104135/

Semester-II

22CAP205N TCP/IP 4H- 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course Objectives

Enable the student

- To learn about IPv4 forwarding and routing.
- To learn about host name resolution
- To learn the Domain Name System (DNS).
- To learn about IPv6 addresses.
- To know the Architectural Overview of the TCP/IP Protocol Suite
- To know about the various protocols such as ARP & RARP

Course Outcomes (Cos)

1. Upon Completion of this course, student will be able to
2. Explain TCP/IP protocols, ports, sockets, and data encapsulation
3. Demonstrate the process of packet fragmentation and reassembly
4. Explain the key features and functions of TCP and UDP
5. Apply the knowledge of DNS queries, name resolution, zone data transfers and reverse DNS queries
6. Analyze the knowledge of TCP/IP routing for the working of routing protocols
7. Find the difference between TCP and UDP

Unit I - Introduction

Introduction: WAN, WAN technologies - Internetworking concepts - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices – Routing Concept - Classful IP Addressing – Subnetting – Super netting – Classless Addressing

Unit II – ARP & RARP

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram-Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum.IP Package ICMP: Types of Messages - Message Format – Error Reporting – Query – Checksum -ICMP Package

Unit III- Routing And Routed Protocols

Routing and Routed Protocols- Inter and Intra Routing Protocol- Autonomous Systems – Routing Table - Interior Gateway Protocols – Exterior Gateway Protocols – Routing in Internet. Group Management – IGMP Message – IGMP Operation – Process to Process Communication.

Unit IV - UDP Operation

UDP Operation – TCP Services conjunction control - Flow Control – Multicast Routing – Multicast Routing Protocols. BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records.TELNET

Unit V – Remote Login

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells. MobileIP: Addressing – Agents – Agent discovery – Registration – Data Transfer – VPN.

Suggested Readings

1. Behrouz A. Forouzan, 2010. "TCP/IP Protocol Suite, 4th Edition. New Delhi: Tata McGraw Hill Publication.
2. Douglas E. Comer, 2000. "Internetworking With TCP/IP, Vol 1: Principles Protocols and Architecture", 4th Edition. New Delhi: Pearson Education.
3. William Stallings, 1997. "Data and Computer Communication", 5th Edition. New Delhi: Prentice Hall of India.

Websites

1. en.wikipedia.org/wiki/Internet_protocol_suite
2. http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
3. www.yale.edu/pclt/COMM/TCPIP.HTM
4. www.w3schools.com/tcpip/default.asp

NPTEL

1. https://nptel.ac.in/courses/106105084/
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105084/lec33.

Semester-II

22CAP205S Object Oriented Analysis and Design with UML 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course Objectives

Enable the student

- To use object-oriented technologies and Unified Modeling Language 2.2
- To perform object-oriented analysis and design
- To explain how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.
- To know about class diagrams
- To design the application using interaction diagram
- To construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation.

Course Outcomes (Cos)

1. Upon Completion of this course, student will be able to
2. Understand of programming language concepts;
3. Demonstrate the software engineering principles
4. Apply the principles of software engineering to software design; Apply the knowledge of OOAD to complete large software project
5. Analyze the deployment of UML diagrams for software design
6. Apply the principles of software engineering quality principles for developing quality software.

Unit I - Structure of Complex Systems

Complexity: The structure of complex systems-the inherent complexity of software-The five attributes of a complex system-Organized and Disorganized Complexity-Bringing order to Chaos-on Designing complex systems. The Object model: The evolution of the object model- Foundations of the object model-Elements of the object model-Applying the object model, object-oriented system development life cycle.

Unit II – Introduction of Classes and Objects

Classes and Objects: The nature of an object-Relationship among objects-The nature of a class-Relationships among classes-The interplay of classes and objects-On building quality classes and objects.

Unit III – Classification and Notation

Classification: The importance of proper classification-Identifying classes and objects-Key abstraction and mechanisms. Notation: The unified modeling language-Package diagrams-Component diagrams.

Unit IV - Deployment Diagrams

Deployment diagrams-Use case diagrams-Activity Diagrams-Class Diagrams-Sequence Diagrams-Interaction overview diagrams-Composite structure diagrams -State machine diagrams-Timing Diagrams-Object diagrams-communication diagrams.

Unit V - Process and Pragmatics

Process: First principles-The Macro Process: The software development lifestyle- The Micro Process: The analysis and design process. Pragmatics: Management and planning-Staffing- Release Management-Reuse-Quality assurance and metrics

CASE study and TOOLS

Railway domain: Platform assignment system for the trains in a railway station - Academic domain: Student Marks Analyzing System - ATM system - Stock maintenance - Quiz System - E-mail Client system - Cryptanalysis – Health Care Systems. Use Open-source CASE Tools: Star UML/ UML Graph for the above case studies.

Suggested Readings

1. Grady Booch, 2007. Object Oriented Analysis and Design, 3rd Edition, AddisonWesley, New Delhi. [UNIT 1 to 4]
2. Martin Fowler, Kendall Scott, 2004. “UML Distilled”, 2nd Edition, Pearson Education, New Delhi. [UNIT 5]
3. James Rumbaugh, Ivar Jcobson and Grady Booch, 2003. “The Unified ModelingLanguage Reference Manual”, 1st Edition, Addison Wesley, New Delhi.
4. Boar, 2004. “Xml Web Services in The Organization”, Wp publisher

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1. uml-tutorials.trireme.com/
2. http://www.devshed.com/c/a/Practices/Introducing-UMLObjectOriented-Analysis-and-Design/
3. http://community.sparxsystems.com/tutorials/object-oriented-analysis-and-design

NPTEL

1. https://nptel.ac.in/courses/106105153

Semester-II

22CAP205W Web Services 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To be able to describe the interoperable web services architecture, including the roles of SOAP and WSDL.
- To use lower-level SOAP and XML APIs for services and/or clients.
- To build and Host Web Services.
- To apply the web service security
- To know the basic WSDL structure
- To develop the web service application

Course Outcomes (Cos)

Upon completion of the course, students will be able to

1. Understand the use of web services in B2C and B2B applications
2. Understand the design principles and application of SOAP
3. To know the principles of REST based web services.
4. Design collaborating web services according to a specification.
5. Implement an application that uses multiple web services in a realistic business scenario.
6. Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consumethem.

Unit I – Introduction to Web Services

Introduction: What are Web Services – Importance of web services – Web services and enterprises; XML Fundamentals: XML Documents - Namespaces – Schema – Processing XML.

Unit II – Soap and WSDL

SOAP: SOAP Model – messages – Encoding – RPC – Alternative SOAP encodings – Document, RPC, Literal, Encoded – SOAP, Web Services and the REST Architecture.

WSDL: Structure – Using SOAP and WSDL. UDDI- UDDI Business Registry – Specification – Data Structures – Life cycle Management – Dynamic Access Point Management, WSDLbindings, VSDLTools. limitations of WSDL.

Unit III – Introduction to Web Services and Workflow

Advanced Web Services Technologies and Standards: Conversation – Overview – Web Services Conversation Language – WSCL Interface Components- Workflow-Business Process Management – Workflow and Workflow Management systems – BPEL. Transaction –ACID transaction – Distributed Transaction – OASIS Business Transaction Protocol.

Unit IV - Web Service Security

Security – Security Basics – Security Issues – Types of Security Attacks – WS –Security. Mobile and Wireless – Mobile Web Services – Challenges with mobile – Proxy Based MobileSystems - Direct Mobile Web service access - J2ME Web Services XML digital signature. XKMSstructure. Guidelines for signing XML documents.

Unit V - Web Service Applications

Building Real World Enterprise Web Service and Applications: Real World Web Service Application Development – Development of Web services and Applications onto Tomcat application Server and Axis Soap Server.

Suggested Readings

1. Martin Kalin, 2013. "Java Web Services: Up and Running", 2nd Edition, O'Reilly Media,USA.
2. Sandeep Chatterjee, James Webber, 2009. "Developing Enterprise Web Services: An Architect's Guide", 4th Edition, Pearson Education, New Delhi.
3. Vikram Ramchand, Sonal Mukhi, 2008. "XML Web Services and SOAP", 1st Edition, BPB Publications, New Delhi.
4. Eric A Marks and Mark J Werrell, 2003. "Executive Guide to Web Services", 1st Edition, John Wiley and Sons, New Delhi

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1. www.w3schools.com/webservices/default.asp
2. en.wikipedia.org/wiki/Web_service
3. www.webservices.org/
4. https://www.cl.cam.ac.uk/~ib249/teaching/Lecture1.handout.pdf
5. http://www.codejava.net/java-ee/web-services/create-client-server-application-for-web-service-in-java

NPTEL

1. https://nptel.ac.in/courses/106106156
2. https://nptel.ac.in/courses/106105219

Semester-II

22CAP205DS Natural Language Processing 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal: **40** External: **60** Total: **100**

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To introduce the fundamental concepts and techniques of natural language processing (NLP)
- To understanding of the models and algorithms in the field of NLP.
- To demonstrate the computational properties of natural languages and
- To develop the commonly used algorithms for processing linguistic information.
- To understanding Lexical and syntactic levels of languages for processing
- To understanding semantics and pragmatics of languages for processing

Course Outcomes (Cos)

Upon completion of the course, students will be able to

1. Understand the fundamental concepts and techniques of natural language processing (NLP)
2. Understanding of the models and algorithms in the field of NLP.
3. Demonstrate the computational properties of natural languages and
4. Develop the commonly used algorithms for processing linguistic information.
5. Understanding Lexical and syntactic levels of languages for processing
6. Understanding semantics and pragmatics of languages for processing

Unit I -Introduction to NLP

Introduction – Models -and Algorithms - The Turing Test -Regular Expressions Basic Regular Expression Patterns -Finite State Automata -Regular Languages and FSAs – Morphology - Inflectional Morphology - Derivational Morphology – Finite – State Morphological Parsing - Combining an FST Lexicon and Rules -Porter Stemmer

Unit II -N-grams Models

N-grams Models of Syntax - Counting Words - Unsmoothed N-grams – Smoothing-Backoff - Deleted Interpolation – Entropy - English Word Classes - Tagsets for English -Part of Speech Tagging -Rule-Based Part of Speech Tagging - Stochastic Part of Speech Tagging – Transformation-Based Tagging.

Unit III- Context Free Grammars

Context Free Grammars for English Syntax- Context-Free Rules and Trees – Sentence-Level Constructions –Agreement – Sub Categorization – Parsing – Top-down – Earley Parsing -Feature Structures - Probabilistic Context-Free Grammars

Unit IV- Representing Meaning

Representing Meaning - Meaning Structure of Language - First Order Predicate Calculus-Representing Linguistically Relevant Concepts -Syntax-Driven Semantic Analysis -Semantic

Attachments - Syntax-Driven Analyzer - Robust Analysis - Lexemes and Their Senses - Internal Structure - Word Sense Disambiguation -Information Retrieval

Unit V- Discourse

Discourse -Reference Resolution - Text Coherence -Discourse Structure - Dialog and Conversational Agents - Dialog Acts – Interpretation – Coherence -Conversational Agents - Language Generation – Architecture -Surface Realizations – Discourse Planning – Machine Translation -Transfer Metaphor – Interlingua – Statistical Approaches.

Suggested Readings

1. D. Jurafsky and J. Martin,2020. "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition".
2. Daniel J and James H. Martin, Speech and language processing, 2009. "An introduction to natural language processing, computational linguistics & speech recognition‖", Prentice hall.
3. Lan H Written and Elbef, MarkA.Hall, 2013. "Data Mining: Practical Machine Learning Tools And Techniques", Morgan Kaufmann.

Websites

1. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview
3. https://www.tutorialspoint.com/natural_language_processing/index.htm

Semester-II

22CAP211 J2EE - Practical 5H - 2C

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To understand J2EE as an architecture and platform for building
- To deploy web-based, n-tier, transactional, component-based enterprise applications
- To understand the fundamental concepts of XML and related technologies
- To acquire knowledge on how XML is currently being used in various application areas
- To know how to parse and transform XML documents via tools and through programming APIs
- To understand the EJB architecture and have a good grasp on when to use and how to use various EJB bean types and acquire relevant Java programming experience

Course Outcomes (COs)

Upon completion of this course, Students will be able to:

1. Characterize the concepts J2SE and J2EE
2. Develop Enterprise Applications using Session Bean, Entity Bean and MDB
3. Demonstrate the hierarchy of Java classes to provide software solutions using Java APIs
4. Analyze the components and patterns of Java Servlet architecture for web applications
5. Apply systematic Java programming knowledge to connect backend and front end
6. Implement the Java Servlet to transfer data

List of Programs

1. Create a sign in form in servlets.
2. Write a servlet Program to lock a server.
3. Write a servlet program that returns list of information in table format.
4. Design a counter that counts number of times user has visited the site in current browsing session.
5. Write a program to create JDBC connectivity with Oracle Database.
6. Build a JAVA Bean for opening an applet from JAR file.
7. Write a program to create RMI client and server to invoke remove method of RMI server.
8. Design a counter in JAVA BEAN.
9. Write a program to stream contents of a file using JSP.
10. Write a program to insert a menu applet into JSP page.

Suggested Readings

1. Jim Keogh, 2017. "The Complete Reference J2EE", 1st Edition, Tata MGraw Hill Edition, New Delhi.
2. Paul J Perrone, Venkata S R RChaganti, S .R.Venkata Krishna, R Chaganti and Tom Schwenk, 2003. J2EE Developer's Handbook, Sams Publications.
3. Rod Johnson, 2004. "J2EE Development without EJB", 1st Edition, Wiley Dream Tech India, New Delhi.
4. Rod Johnson, 2004. "Expert One-On-One J2ee Design and Development", John Wiley& Sons, Incorporated.
5. Joseph J Bambara et. al. ,2001. "J2EE Unleashed", 1st Edition, Tech Media.

Websites

1. https://catalogimages.wiley.com/images/db/pdf/0764543857.excerpt.pdf
2. https://vdocuments.site/practical-j2ee-application-architecture-586df42a4fc06.html
3. https://doc.lagout.org/programmation/Java/J2EE%20Developer%27s%20Handbook%20%5BPerrone%2C%20Chaganti%20%26%20Schwenk%202003-06-09%5D.pdf

22CAP212 Mobile Computing - Practical Semester-II 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To define the concepts and technology of wireless communication in mobile computing fielding.
- To describe the principles of networking that support connectivity to cellular networks, wireless internet and sensor devices.
- To explain the techniques involved in the functioning of Mobile Adhoc Networks
- To know the techniques involved in Vehicular Adhoc Networks.
- To examine the characteristics, techniques and technology of 1G,2G,3G and 4G
- To demonstrate the features of Android Mobile Operating System for developing Android Applications

Course Outcomes (COs)

Upon completion of this course, Students will be able to:

1. Analyze the architecture, merits and demerits of Wireless technologies like Infra Red,blue tooth, Wi-Fi, RFID and Wi-Max.
2. Characterize the principles of mobile technologies like GPRS, GSM, CDMA, and TDMA
3. Compare the characteristics and techniques MANET with VANET
4. Analyze technology of 1G, 2G, 3G and 4G for gaining the working knowledge of four generation wireless technologies.
5. Apply the features of Android programming for developing Android Applications
6. Identify the features involved in Bluetooth technology.

List of Programs

1. Write a program to build your first Android Application “Hello World” with common activity.
2. Write a program which will implement Sub menu in android application.
3. Write a program which will implement Context menu (Floating List of Menu Items) in android application.
4. Write a program to displays the use of Relative Layout Views with different attributes.
5. Write a program to displays the use of Linear Layout Views with different attributes.
6. Write a program to implement a Custom Button and handle the display message on button press.
7. Write a program to implement the List View in your android application.
8. Write a program to implement between animations and rotate the text in your android application.
9. Write a sample program to create a progress bar for your android applications.

10. Write a program to show how to use Date picker control of ADK in your android applications.
11. Write a program which enables you to draw an image using bitmap class object.
12. Write a program which allows you to get image from web and displayed them using the Image View.

Suggested Readings

1. Asoke K. Talukder, Roopa R, 2011. "Mobile Computing: technology, applications, and service creation", Tata McGraw Hill, New Delhi
2. Brian Fling, 2009. "Mobile Design and Development", O'Reilly Media Inc.
3. Ashok K Talukder and Roopa R Yuvagal, 2005. "Mobile Computing", Tata McGraw Hill Publishing Company Limited.
4. Ivan Stojmenovic, 2002. "Handbook of Wireless Networks and Mobile Computing", A Wiley-Inter science Publication.
5. Jochen Schiller, 2000. "Mobile Communication", Addison Wesley.

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1. http://ps.fragnel.edu.in/~dipalis/prgdwnl/Mobile_Computing_Manual_CompEngg%20Sem%20VII.pdf
2. https://www.wileyindia.com/mobile-communication-and-computing-includes-lab-exercises.html

Semester-II

22CAP213D DBA - Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective

Enable the student

- To install and configure database
- To create users and assign roles
- To optimize schemas, tables, indexes and views
- To manage database services and clients
- To move the data from one database to another database.
- To take backup and perform recovery.

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Design, model and install any database management systems by using Oracle database as sample.
2. Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance.
3. Define and devise transaction management, concurrency control, crash recovery components.
4. Examine and perform data base administration roles.
5. Examine the database operations by using Oracle database system as a sample.
6. Apply the knowledge of VLDB to control the distributed databases.

List of Programs

1. Demo for Globalization Support
2. Setup Listener Security
3. Configuring Recovery Manager
4. Write a program Using Recovery Manager
5. Write a program for Managing Diagnostic Sources
6. Implement Database Recovery
7. Demo for Flashback Database
8. Implement User Error Recovery
9. Write a program for Dealing with Corruption
10. Show the demo for Automated Management
11. Creating a database and do the manipulation.
12. Managing index tables

Suggested Readings

1. Amarnath Reddy, 2018. "Oracle DBA 11g/12c – Database Administration for junior DBA".
2. Saikat Basak, 2010. "Oracle DBA Concise Handbook", Ensel Software.
3. Bob Bryla, Kevin Loney, 2008. "Oracle Database 11g DBA Handbook", McGraw-Hill Osborne.

Websites

1. https://www.oracletutorial.com/oracle-administration/
2. https://www.udemy.com/course/sql-server-administration-practicals/
3. https://www.pluralsight.com/resource-center/guides/guide-to-becoming-a-database-admin

Semester-II

22CAP213N Network Security - Practical 4H- 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To teach fundamental aspects of security in a modern networked environment with the focus on system design aspects and cryptography in the specific context of network.
- To build protection mechanisms in order to secure computer networks.
- To write coding to encrypt "Plain Text" into "Cipher Text" and vice versa, using different encryption algorithms.
- To choose a suitable ciphering algorithm according to the required security level.
- To build cryptosystems by applying encryption algorithms.
- To build secure authentication systems by use of message authentication techniques.
- To know about the blockchain technology.

Course Outcomes (Cos)

Upon completion of this course, students will be able to:

1. Classify the symmetric encryption techniques
2. Illustrate various public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Demonstrate the basic concepts of system level security
6. Apply the block chain technology for security

List of Programs

1. Write a program to convert your college name from plain text to cipher text using Transposition cipher method of encryption.
2. Write a program to convert your name from plain text to cipher text using the One Time Pads method of encryption.
3. Write a program to encrypt a paragraph using the Data Encryption Standard Algorithm.
4. Write a program to encrypt your biodata using the Advanced Encryption Standard Algorithm.
5. Write a program to decrypt the "Network Security" theory syllabus using the RSA Algorithm.
6. Write a program that takes a binary file as input and performs bit stuffing and Cyclic Redundancy Check Computation.
7. Write a program to simulate the working of Sliding-Window protocol.
8. Write a program to find the shortest path in a network using Dijkstra's Algorithm.
9. Write a program for the following chat application:
10. One to One: Open a Socket connection and display what is written by one to another. Many to Many: Each Client Opens a Socket connection to the client server and writestothe socket.

Whatever is written by one can be seen by all. Implement symmetric keycryptography.

11. Write a program to implement *International Data Encryption* Algorithm (*IDEA*).

Suggested Readings

1. William Stallings, 2013. "Cryptography and Network Security", 6th Edition. Pearson Education, New Delhi.
2. A.Menezes, P.Van Oorschot and Vanstone, 2010. "Hand Book of Applied Cryptography", 2nd Edition. CRC Press, New Delhi.
3. Ankit Fadia, 2010. "Network Security", 2nd Edition. McMillan India Ltd, New Delhi.
4. Bruce Schneir, 2006. "Applied Cryptography", 2nd Edition. CRC Press, New Delhi.

Websites

1. williamstallings.com/Crypto3e.html
2. u.cs.biu.ac.il/~herzbea/book.html
3. www.flipkart.com/search-books/cryptography+and+network+security+William+ stallings+ebook

Semester-II

22CAP213S Software Testing and Quality Assurance – Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To perform test each time they are run, thereby eliminating human error.
- To test how the software reacts under repeated execution of the same operations.
- To program sophisticated tests which bring out hidden information from the application.
- To reuse tests on different versions of an application, even if the user interfaces changes.
- To know the risks in project management system
- To know about various testing

Course Outcomes (COs)

Upon completion of this course, students will be able to

1. Test the software by applying testing techniques to deliver a product free from bugs
2. Evaluate the web applications using bug tracking tools.
3. Investigate the scenario and the able to select the proper testing technique
4. Explore the test automation concepts and tools
5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma
6. Evaluate the estimation of cost, schedule based on standard metrics

List of Programs

1. Create a VB form with the following fields and create the database also for them. Insert 3 records. Using Win Runner tool record the above 3 transaction and test them and produce the Report. (Black box Testing).
2. Create a VB form and then add login dialog form. Using Win Runner tool check the Username and Password and produce the Report. (Security testing).
3. Create a VB form with the following fields and check the calculation is correct or not by using the test tool Win Runner. (Functional Testing) Fields – Name, Designation, Department, Basic, HRA, DA, PF and netsal.
4. Using Win Runner test tool check the database values after changing. Using Flight database. (Regression testing).
5. Write a C program for Boundary Testing.
6. Write a C program for Loop Testing.
7. Write a C program for Interface Testing.
8. Write a C program for Unit testing.
9. To Perform Checking GUI Objects using Win Runner tool
10. To perform Synchronization test using Win Runner

Software Quality Assurance

1. To develop a banking application, perform the requirement analysis and give a quality status report.
2. Perform the system testing to develop an electricity application and give a quality status report.
3. Perform the report design and give a quality status report.
4. Develop a library management system and give a quality status report.
5. Develop a hospital management system and a quality status report and give a comparison performance report in Linux and windows operating system.

Suggested Readings

1. Dorothy Graham,Rex Black, and et.al, 2011. "Foundations of Software Testing - ISTQB Certification", 3rd Edition, Cengage Learning
2. R.Rajani, and P.P.Oak, 2004. "Software Testing", Tata Mcgraw Hill, New Delhi.
3. Boris Beizer, 2003. "Software Testing Techniques", II Edition., DreamTech India, New Delhi. (UNIT – I, II, III, IV)
4. Marnie L Hutcheson, 2003. "Software testing fundamentals", 1st Edison, Wiley, DreamTech India, New Delhi. (UNIT – V)
5. Burnstein, 2003. "Practical Software Testing", Springer International Edison.

Websites

1. https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-the-basics-of-software-quality-management/
2. https://www.softwaretestinghelp.com/what-is-actual-testing-process-in-practical-or-company-environment/
3. https://gaminglabs.com/services/professional-services/software-quality-assurance-testing-practice/

Semester-II

22CAP213W **Angular JS – Practical** **4H - 2C**

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Internal: 40 External: 60 **Total: 100**

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To utilize AngularJS formats adequately
- To make the perplexing structures quickly
- To confine web applications to take into account worldwide groups of onlookers
- To make Secured web application s from dangers and pernicious clients
- To understand the compiler for building better and more propelled orders
- To organize the web application utilizing the vigorous index structure

Course Outcomes (Cos)

Upon successful completion of this course, students will be able to:

1. To apply an AngularJS Single Page Application from scratch
2. To build an awesome User Interface
3. To create and bind controllers with JavaScript
4. To separate the model, view, and controller layers of your application and implement them using AngularJS
5. To integrate and enhance Angular applications with other useful JavaScript libraries such as Node.js
6. Test the application using AngularJS

List of Programs

1. Write a simple program using AngularJS modules and controllers.
2. Create a page using AngularJS that will add two numbers
3. Write a program to perform arithmetic operations using AngularJS expressions
4. Create an automatic counter using AngularJS
5. Create a simple calculator in AngularJS
6. Implement TODO list using AngularJS
7. Implement Dependency Injection in AngularJS - with and without introspection
8. Implement an infinite recursive template in AngularJS for representing tree structures
9. Create a simple pages or tabs using AngularJS
10. Create a Student Information form with submit and reset functionality
11. Implement Client-side validation in AngularJS
12. Implement simple routing in AngularJS application

Suggested Readings

1. Chandermani Arora, Kevin Hennessy, 2018. "Angular 6 by Example: Get up and running with Angular by building modern real-world web apps", 3rd Edition, Kindle Edition.
2. Agus Kurniawan, 2014. "AngularJS Programming by Example", First Edition
3. Adam Freeman, 2014. "Pro AngularJS ", First Edition, Apress.
4. Brad Green and Shyam Seshadri, 2013. "Angular JS", O'Reilly Publications, First edition.

Websites

1. https://tutorialzine.com/2013/08/learn-angularjs-5-examples
2. https://leanpub.com/Practical_AngularJS/read
3. https://dwmkerr.com/practical-angularjs-part1/

Semester-II

22CAP213DS Foundations of Data Science-Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Enable the student

- To study the basic concepts of Data Science and data lifecycle.
- To understand the theoretical and mathematical aspects of Data Science models.
- To learn common random variables and their uses, and with the use of empirical distributions.
- To obtain the knowledge in data management tools.
- To explore the major techniques for data science.

Course Outcomes (Cos)

Upon successful completion of this course, students will be able to:

1. Understand the key concepts in data science, including tools and approaches.
2. Understand the concepts in data collection, sampling and probabilistic models.
3. Understand the various techniques in data science
4. Apply the mathematical formulation of machine learning and statistical models to visualize the data in various methods.
5. Apply a suitable data science technique to solve an information analytics problem.

List of Programs

1. Matrix manipulations.
2. Creating and manipulating a List and an Array.
3. Manipulation of vectors and matrix.
4. Operators on Factors in R
5. Working with looping statements.
6. Find subset of dataset by using subset (), aggregate () functions on iris dataset
7. Find the data distributions using box and scatter plot.
8. Find the correlation matrix and plot the correlation plot on dataset and visualize it

Suggested Readings

1. Saltz Jeffrey S, 2019. “An Introduction to Data Science”, Second Edition, Sage Publications Inc.
2. Peter Bruce & Andrew Bruce, 2017. “Practical Statistics for Data Scientists”, First Edition, O’Reilly Publication.
3. Murtaza Haider, 2015. “Getting Started with Data Science: Making Sense of Data with Analytics”, IBM Press.
4. Glenn J. Myatt, Wayne P. Johnson, 2014. “Making Sense of Data I: A Practical Guide to

Exploratory Data Analysis and Data Mining", Second Edition, John Wiley & Son Publication
5. Dawn Griffiths, 2008. "Head First Statistics", First Edition, O'Reilly Publication

Websites

1. https://www.inferentialthinking.com/chapters/intro
2. https://www.openintro.org/stat/
3. https://swayam.gov.in/nd1_noc20_cs36/preview
4. https://swayam.gov.in/nd1_noc19_cs60/preview
5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016

Semester III

22CAP301 PHP/MySQL 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives:

Enable the student

- To help the students
- To get hands-on experience in scripting, debugging, testing.
- To establish a working environment for PHP web page development
- To learn to create dynamic interactive pages with PHP.
- To learn to manipulate files with PHP.
- To learn to use SQL to output reports with MySQL
- To write pseudo code for an application

Course Outcomes (Cos):

Upon completion of this course, student will be able to:

1. Implement regular expressions in PHP programming including modifiers, operators, and metacharacters.
2. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
3. Analyze and solve various database tasks using the PHP language.
4. Create server-side web applications using PHP and MySQL.
5. Analyze the structure of an E-Mail message
6. Develop the files and directories management operation

Unit I - Basics of PHP

Introduction to PHP – what does PHP Do? – a brief history of PHP – language basics– lexical structure – data types – variables – expressions and operators – flow control statements-including code – embedding PHP in web pages**.**

Unit II-Testing and Debugging

Basic error types; Debugging PHP Script: Errors in PHP -Preventing the display of private information-Form Validation: Using the Exit statement-string validation and regular expressions - Configuring PHP for error handling - Try/Catch-New in PHP5.Development planning: Formal software Development processes–optimizing your code-Using Coding standard; Functions in PHP-Recursion.

Unit III-Files and Directories

Files and Directory Handling-Random Access File-Ownership and permissions; Splitting the Name and path from a file- Operations on files - Working with Directories: other Directory Functions– Traversing a directory hierarchy-creating a directory navigator-Building a Text Editor-Uploading Files.

Unit IV - MySQL an Overview

Introduction – connecting to and disconnecting from the server – Entering queries –Creating and using a database – Creating and selecting a database – creating a table– loading data into a table – Retrieving information from a table – selecting all data –selecting particular rows – selecting particular columns – sorting rows – date calculations – working with NULL values – pattern matching – counting rows – using more than one tables.

Unit V - MySQL Databases in PHP

Introduction – connecting to a MySQL database – querying the database – Retrieving and displaying the results – modifying data – deleting data. Designing simple applications.

Suggested Readings

1. **Doug Bierer** , 2021. PHP 8 Programming Tips, Tricks and Best Practices: A practical guide to PHP 8 features, usage changes, and advanced programming techniques, 1st edition, Packt Publishing.
2. **Robin Nixon**, 2015. **Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5**, 4th edition, Shroff Publishers
3. **Alan Forbes**,2012.The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and Mysql,6th edition, Beak Check LLC.
4. **Luke Welling** , 2016. PHP and MySQL Web Development (Developer's Library),5th edition Addison-Wesley.
5. **Steven Holzner**, 2017. PHP: The Complete Reference, Raunak php study edition, McGraw Hill Education
6. Frank M. Kromann. 2018. Beginning Php and MySQL: From Novice To Professional, Apress

Websites

1. **www.php.net/**
2. en.wikipedia.org/wiki/PHP
3. **www.w3schools.com/PHP/DEfaULT.asp**
4. **http://www.vlab.co.in/ba-nptel-labs-computer-science-and-engineering**
5. **http://www.nptelvideos.com/php/php_video_tutorials.php**

Semester-III

21CAP302 .Net Programming 4H -4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective

Enable the student

- Create windows forms using arrays and flow control statements.
- Learn to use the classes and namespaces in the .NET Framework class library.
- Develop Web Applications using Microsoft ASP.NET programming.
- Learn to use Basic windows controls using Visual Basic.Net
- Understand the concept of Multiple Document Interface
- Learn the architecture of .NET

Course Outcomes (Cos)

Upon completion of the course, students will be able to

1. Develop Windows based applications using Visual Basic.Net
2. Implement ADO.Net concept in VB.Net and ASP.Net applications
3. Create server side web applications using ASP.NET
4. Analyze the concept of data sources and data bound controls in VB.NET and ASP.NET
5. Demonstrate the working of ADO.Net controls for developing ASP.Net web applications
6. Design the application using ASP.NET Web Server Control

Unit I - Introduction

Getting Started With VB.NET: The Integrated Development Environment-IDE Components-Environment Options. Visual Basic: The Language Variables-Constants-Arrays – Variables as Objects-Flow Control Statements. Working with forms: The appearance of Forms-Loading and Showing Forms-Designing Menus.

Unit II - Basic Windows Controls

Textbox Control- ListBox, CheckedListBox-Scrollbar and TrackBar Controls-More Windows Control-The common Dialog Controls-The Rich TextBox Control - Handling Strings, characters and Dates. The TreeView and ListView Controls: Examining the Advanced Controls.

Unit III - ASP.NET

Goal of ASP.NET –ASP.NET Web Server Control-Validation Server Controls-Themes and Skins -Content Page Holder,ASP.NET - Web Forms, MVC, Core

Unit IV - Data Binding in ASP.Net

Data source Controls – Configuring data source control caching – storing connection information-Using Bound list controls with Data Source Controls – Other Data bound Controls-Data Management with ADO.Net and Working with databases.

Unit V - Web services, WCF

Development & consuming **web services**, WCF Services, **Fundamentals WCF Concepts**, Creating a New Service, Generating a Service and Client Proxy, Hosting a service in IIS, Messaging protocol, WCF Contracts and Serialization, Service Contracts, Approaches to Serialization, Web Service Bindings, Object Oriented Bindings, One way and Duplex Communication, Large Message Transfers, Hosting Features, Hosting in IIS, WCF Exception Handling.

Suggested Readings

1. Evangelos Petroutsos, 2017. Mastering Visual Basic.Net, BPB Publications, New Delhi.
2. Shirish Chavan. 2007. Visual Basic.Net, 1st Edition, Pearson Education, New Delhi.
3. Bill Evjen, Scott Hanselman, Devin Rader, Farhan Muhammad and S.Srinivasa Sivakumar, 2006. Professional ASP.net 2.0, Special Edition.
4. Duncan Mackenzie Kent Sharkey, 2006. Sams Teach yourself Visual Basic.JNet, 1stEdtion, McGraw Hill, NewDelhi.
5. Dave Mercer, ASP.Net Beginner's Guide, 2003. 2nd Edition McGraw Hill, New Delhi.

Websites

1. www.microsoft.com/NET/
2. www.en.wikipedia.org/wiki/.net
3. www.w3schools.com/ngws/default.asp
4. www.vbtutot.com

NPTEL

1. http://www.nptelvideos.com/visualbasic_net/visualbasicnet_video_tutorials.php
2. https://**www.nptelvideos.com/visualbasic_net/**?**pn=1**

Semester-III

22CAP303 Machine Learning 4H – 3C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

Enable the student

- Define the types and theory of machine learning.
- Describe the classification models of machine learning
- Explain the techniques of distance based models of machine learning
- Examine the various tree based and rule based models of machine learning
- Demonstrate the concept of reinforcement learning for game playing
- Describe the association rule mining

Course Outcomes

On successful completion of the course, the student should be able to

1. Analyze theory of machine learning components and models
2. Characterize the algorithms of machine learning to learn linear and non-linear models
3. Implement data clustering algorithms for machine learning process
4. Construct machine learning algorithms to learn tree and rule-based models
5. Apply reinforcement machine learning techniques for robotics
6. Develop the applications in game playing

Unit I - Foundations of Learning

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound –bias and variance – learning curve

Unit II - Linear Models

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – generalization and over fitting – regularization – validation

Unit III - Distance-Based Models

Nearest neighbor models – K-means – clustering around medoids – silhouttes – hierarchical clustering – k- d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta silhouttes – hierarchical clustering – k-d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta learning

Unit IV - Tree and Rule Models

Decision trees – learning decision trees – ranking and probability estimation trees –Regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first -order rule learning

Unit V - Reinforcement Learning

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal - difference learning – active reinforcement learning – exploration – learning an action utility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

Suggested Readings

1. Tom.M.Mitchell, 2017. Machine Learning, Tata McGraw Hill Publications
2. Y. S. Abu - Mostafa, M. Magdon-Ismail, and H.-T. Lin., 2012. Learning from Data, AML Book Publishers.
3. P. Flach, 2012. "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press.
4. K. P. Murphy, 2012. Machine Learning: A probabilistic perspective, MIT Press,
5. D. Barber, 2012. Bayesian Reasoning and Machine Learning, Cambridge University Press.

Websites

1. https://machinelearningmastery.com/linear-regression-for-machine-learning/
2. https://**www.cambridge.org/core/books/machine-learning/distancebased-models/**
3. https://dzone.com/articles/machine-learning-with-decision-trees
4. **http://reinforcementlearning.ai-depot.com/**

NPTEL

1. https://nptel.ac.in/courses/106106139/
2. https://swayam.gov.in/nd1_noc19_cs81/preview

Semester-III

22CAP304D Data Mining and Data Warehousing 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

Enable the student

- To gain the knowledge of the concepts and techniques in data mining
- To understand the data mining functionalities and pattern classification.
- To understand the cleaning and clustering process of data mining.
- To gain the knowledge of data warehouse architecture in data mining process
- To know about the Multimedia database
- To know about data warehouse

Course Outcomes (Cos)

Upon completion of this course, student will be able to :

1. To understand the data mining process of voluminous data using OLAP
2. To implement the preprocessing concept in data mining applications
3. To apply the data mining algorithms on big data to extract useful data
4. To implement data mining techniques for complex data types
5. To implement Decision Support System concept in data mining for developing intelligence business applications
6. To apply the web data mining

Unit I - Introduction

Motivation and importance, Data Mining, Relational Databases, Data Warehouses, Transactional Databases, Advanced Database **Systems** and Advanced Database Applications, Data Mining Functionalities, Pattern Classification of Data Mining Systems, Major issues in Data Mining. Pre-process the Data- Data Cleaning, **Data Integration** and Transformation.

Unit II - Classification and Regression Algorithms

Naïve Bayes – Multiple Regression Analysis – Logistic Regression – k-Nearest Neighbour Classification – GMDH –Computing and Genetic Algorithms. Support Vector Machines : Linear SVM - SVM with soft margin – Linear kernel – Proximal SVM – Generating Datasets.
Cluster Analysis : Partitional Clusterings – k-medoids – Birch

Unit III - Mining Rule

Mining Association rule in large Databases Association Rule Mining, Mining Single - Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Dataware houses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Unit IV

Mining Complex Types of Data : Mining Spatial Databases – Multimedia Databases – Time-series and Sequence Data – Text Databases – Web Data Mining – Search Engines. Machine learning VS Data Mining.

Unit V - Data Warehouse and OLAP Technology for Data Mining

What is a Data Warehouse? Multi-Dimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Development of Data Cube Technology, Data Ware housing to Data Mining Data Preprocessing Data Warehousing: Operational vs. DSS- Building blocks: features- Data warehouse and Data Mart- Overview of the Components- Metadata Architectural Components: Distinguishing Characteristics- Architectural Framework- Technical Architecture.

Suggested Readings:

1. Jiawei Han and Micheline Kamber, 2011. Data Mining Concepts and Techniques, 3rd Edition, Elsivier,India (Unit I, III, IV, V)
2. G.K.Gupta, 2006. Introduction to Data Mining with Case Studies, Prentice Hall India, NewDelhi (Unit – IV)
3. Soman.K.P, Shyam Divakar and V. Ajay, 2008. Insight to Data Mining- Theory andPractical, Prentice Hall India, New Delhi. (Unit – II).
4. Paulraj Ponniah, 2008. Data Warehousing Fundamentals: A Comprehensive Guide for ITProfessionals, John Wiley & Sons, New Delhi.
5. Gupta.G.K., 2006. Introduction to Data Mining with Case Studies, Prentice Hall India, NewDelhi .
6. Kantardzic, 2005. Mining Concepts, Models, Methods and Algorithms, IEEE Press – A John Wiley& Sons.

Websites

1. www.wikipedia.org/wiki/Data_mining
2. www.anderson.ucla.edu/faculty/jason.frand/teacher/technologies/palace/datamining.ht
3. www.thearling.com/text/dmwhite/dmwhite.htm
4. https://www.classcentral.com/course/swayam-data-mining-9821

NPTEL

1. https://nptel.ac.in/courses/106105174/
2. https://nptel.ac.in/courses/110107092/

Semester-III

22CAP304N Network Architecture and Management 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course Objectives

Enable the student

- Learn definitions of network analysis, architecture, and design and the importance of network analysis
- Study about different types of requirements from the user, application, device and network component
- Learn how to identify and characterize traffic flows
- Learn several concepts about network design process
- Learn about SNMP
- Analyze the security mechanism in Computer routing process

Course Outcomes (Cos)

Upon completion of this course, student will be able

1. Gather, derive, define and validate real requirements for the specified network.
2. Understand different types of requirements from the user, application, device and network component
3. Develop traceability between requirements, architecture decisions, and design decisions
4. Implement how and where addressing and routing, security, network management, and performance are required in the network.
5. Use SNMPv1, v2 and v3 protocols.
6. To implement service level agreement in Computer Network management systems

Unit- I - A System Approach To Network Design And Requirement Analysis

Introduction-Network Service and Service based networks- Systems and services- characterizing the services. Requirement Analysis: Concepts – Background – User Requirements- Application Requirements- Host Requirements-Network Requirements – Requirement Analysis: Guidelines – Requirements gathering and listing- Developing service metrics to measure performance – Characterizing behavior- developing performance threshold – Distinguish between service performance levels.

UNIT II - Flow Analysis

Individual and Composite Flows – Critical Flows - Identifying and developing flows – Data sources and sinks – Flow models- Flow prioritization – Flow specification algorithms – Example Applications of Flow Analysis

UNIT III - Logical Design

Background- Establishing design goals- Developing criteria for technology evolution- Making technology choices for design-case study- Shared Medium- Switching and Routing: Comparison and contrast- Switching- Routing-Hybrid Routing/Switching Mechanisms – Applying

Interconnection Mechanism to Design – Integrating Network management and security into the Design- Defining Network Management- Designing with manageable resources- Network Management Architecture- Security- Security mechanism- Examples- Network Management and security plans- Case study.

UNIT IV - Network Design: Physical, Addressing And Routing

Design Concepts – Design Process - Network Layout – Design Traceability – Design Metrics – Logical Network Design – Topology Design – Bridging, Switching and Routing Protocols- Physical Network Design – Selecting Technologies and Devices for Campus and Enterprise Networks – Optimizing Network Design

UNIT V - Network Management and SNMP Protocol Model

Network and System management, Network management system platform; Current SNMP Broadband and TMN management, Network management standards. SNMPV1, SNMPV2 system architecture, SNMPV2, structure of management information. SNMPV2 – MIB – SNMPV2 protocol, SNMPV3- Architecture, Application, MIB, security user based security model, access control RMON

Suggested Readings

1. Laura Chappel and Gerald Analysis‖,Kindle Edition,2013. Combs ,―Wireshark 101: Essential Skills for Network
2. Mani Subramanian, 2012. Network Management – Principles & Practice‖ – 2nd Edition Prentice Hall
3. Mark Newman, 2010. Networks: An Introduction‖,Kindle Edition,.
4. James D. McCabe, Morgan Kaufmann, 2007. Network Analysis, Architecture, and Design By, Third Edition,.ISBN-13: 978-0123704801
5. Computer Networks: 2007. Elsevier Inc. A Systems Approach by Larry L. Peterson, Bruce S. Davie
6. J.Radz,, 2005. Fundamentals of Computer Network Analysis and Engineering: Basic Approaches for Solving Problems in the Networked Computing Environment‖, Universe
7. William Stallings., 2004, SNMP, SNMP2, SNMP3 and RMON1 and 2‖, Pearson Education,
8. Daw Sudira, 2004, Network Management‖, Sonali Publications.

NPTEL

1. https://nptel.ac.in/courses/106/105/106105081/
2. https://nptel.ac.in/courses/106105081
3. https://nptel.ac.in/courses/106105081

Semester-III

22CAP304S Software Project Management 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective

Enable the student

- To design, select and apply the most appropriate software engineering process for developing any software project
- To implement planning for software project and identify the risks in software planning.
- To analyze the software requirements for developing any software.
- To understand the importance of negotiation, effective work habits, leadership in the software development process.
- To identify the risks involved in software project management
- To know the organization structure to develop the software project

Course Outcomes (Cos)

Upon Completion of this course, the student will be able to

1. Implement the concept of software effort estimation in developing software project.
2. Develop a responsible attitude towards the use of computer as well as the technology.
3. Evaluate the risks during the development of software projects
4. Understand the organization behavior in software project management.
5. Implement team management process in developing quality software
6. Monitor the software project management in various ways such as cost control, performance control, etc.,

Unit I - Introduction

Software Project Management -Project evaluation and program Management- An overview of Project planning- Stepwise planning-Selection of an appropriate project Approach.

Unit II - Software Effort Estimation

Problems with over- and underestimates-Software effort estimation Techniques - Estimating by analogy -Albrecht function point analysis -Function points Mark II –COSMIC full function points - COCOMO 13: a parametric productivity model. Activity planning: The objectives of activity Planning-Project schedules - Projects and activities - Sequencing and scheduling activities - Network planning models - Formulating a network model - Adding the time dimension - The forward pass - The backward pass - Identifying the critical path.

Unit III - Risk management

Introduction to Risk - Categories of risk - A framework for dealing with risk -Risk identification - Risk assessment - Risk planning - Risk management - Evaluating risks to the schedule - Applying the PERT technique - Monte Carlo simulation - Critical chain concepts. Resource allocation :-Introduction -The nature of resources - Identifying resource requirements - Scheduling resources -Creating critical paths -Counting the cost - Being specific -Publishing the resource schedule - Cost schedules -The scheduling sequence.

Unit IV - Monitoring and control

Creating the framework-Collecting the data- Visualizing progress- Cost monitoring -Earned value analysis-Prioritizing monitoring - Getting the project back to target - Change control. Managing people in software environments: Understanding behavior -Organization behavior: a background - Selecting the right person for the job - Instruction in the best methods – Motivation - Stress -Health and safety -Some ethical and professional concern

Unit V - Working in Teams

Becoming a team - Decision making - Organizational structures - Coordination dependencies - Dispersed and virtual teams - Communication genres -Communication plans - Leadership. Software quality: Introduction -The place of software quality in project planning - The importance of software quality - Defining software quality - ISO 9126 -Product versus process quality management -Quality management systems -Process capability models -Techniques to help enhance software quality -Testing -Quality plans and software testing tools.

Suggested Readings

1. Kelkar, 2012. "Software Project Management", 3rd edition, Prentice Hall India
2. Bob Hughes and Mike Cotterell, 2011. Software Project Management, 5th Edition, New Delhi: Tata McGraw Hill
3. Royce, 2000, Software Project Management, 1st Edition, New Delhi: Addisions Wesley.

Websites

1. **http://en.wikipedia.org/wiki/Software_project_management**
2. **http://www.onesmartclick.com/engineering/software-engineering.html**
3. **http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/**
4. https://**www.classcentral.com/course/swayam-software-project-management-14294**

NPTEL

1. https://nptel.ac.in/courses/106105218/
2. https://swayam.gov.in/nd1_noc19_cs70/preview

Semester-III

22CAP304W Web Programming Essential 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course objectives

Enable the student

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice embedded dynamic scripting on client side Internet Programming
- To understand and practice web development techniques on client-side
- To explain concept of Java Script for developing web applications
- To explain the working of LAMP server for executing PHP Applications
- To know about AJAX and JQuery

Course outcomes (Cos)

1. Acquire knowledge about functionalities of world wide web
2. Explore markup languages features and create interactive web pages using them
3. Learn and design Client side validation using scripting languages
4. Acquire knowledge about Open source JavaScript libraries
5. Able to design front end web page and connect to the back end databases.
6. Apply JQuery in the web page development

Unit I - Introduction to WWW

Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages.

Unit II - UI Design

Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts – Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames -HTML Forms. Cascading Style Sheet (CSS): The need for CSS, Introduction to CSS – Basic syntax and structure -Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds – Manipulating text - Margins and Padding - Positioning using CSS.

Unit III - Introduction to JavaScript

Introduction - Core features - Data types and Variables - Operators, Expressions, and Statements - Functions - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling- Controlling Windows & Frames and Documents - Form handling and validations.

Unit IV - Advanced JavaScript

Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – JSON - jQuery and AJAX.

Unit V- Lamp Server

Introduction - How web works - Setting up the environment (LAMP server) - Programming basics - Print/echo - Variables and constants – Strings and Arrays – Operators, Control structures and looping structures – Functions – Reading Data in Web Pages - Embedding PHP within HTML Establishing connectivity with MySQL database.

Suggested Readings

1. David Flanagan, 2013, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media,
2. Achyut S Godbole and Atul Kahate, 2012. "Web Technologies", Second Edition, Tata McGraw Hill.
3. Thomas A Powell, Fritz Schneider, 2011. "JavaScript: The Complete Reference", Third Edition,Tata McGraw Hill
4. Steven Holzner, 2008. "The Complete Reference - PHP", Tata McGraw Hill,
5. Mcgrath Mike, "PHP & MySQL", In Easy Steps Limited
6. Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, 2007. "Internet and WorldWide.

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3. https://**www.w3schools.com/whatis/whatis_es5.asp**
4. https://**www.w3schools.com/whatis/whatis_bootstrap.asp**
5. https://**www.edx.org/course/pro**g**ramming-for-the-web-with-javascript**
6. https://**www.m**y-**mooc.com/en/categorie/web-development**

NPTEL

1. https://nptel.ac.in/courses/106106156/

LMS

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Semester-III

22CAP304DS Data Visualization 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course Objectives

Enable the student

- To know the importance of data Visualization in the world of Data Analytics and Prediction
- To know the important libraries in Tableau
- To get equipped with Tableau Tool
- To create charts using Tableau Tool
- To aggregate data using Tableau Tool
- To visualize data as maps and forecast future data using Tableau Tool

Course Outcomes (COs)

Upon completion of this course students will be able to:

1. Visualize data through seven stages of data analysis process
2. Explore hybrid types of data visualization
3. Understand various stages of visualizing data
4. Create charts using Tableau Tool
5. Aggregate data using Tableau Tool
6. Visualize data as maps and forecast future data using Tableau Tool

Unit I-Creating Visual Analytics with tableau

Creating Visual Analytics with tableau desktop, connecting to your data-How to Connect to your data, What are generated Values? Knowing when to use a direct connection, Joining tables with tableau, blending different data sources in a single worksheet.

Unit II-Building your first Visualization

Building your first Visualization- How Me works- Chart types, Text Tables, Maps, bar chart, Line charts, Area Fill charts and Pie charts, scatter plot, Bullet graph, Gantt charts, Sorting data in tableau, Enhancing Views with filters, sets groups and hierarchies.

Unit III-Creating calculations

Creating calculations to enhance your data- What is aggregation, what are calculated values and table calculations, Using the calculation dialog box to create, Building formulas using table calculations, Using table calculation functions

Unit IV-Using maps to improve insights

Using maps to improve insights-Create a Standard Map View, Plotting your own locations on a map, Replace Tableau's standard maps, Shaping data to enable Point-to-Point mapping.

Unit V-Developing an Adhoc analysis

Developing an Adhoc analysis environment- generating new data with forecasts, providing self-evidence adhoc analysis with parameters, Editing views in tableau Server.

Suggested Readings:

1. Joshua N. Millign, 2019. “Learning Tableau ”, Third Edition- Packt publications Student Activity
2. Cole Nussbaumer Knaflic ,2014. “Storytelling with Data: A Data Visualization Guide for Business Professionals
3. Noah Iliinsky, Julie Steele , 2011, Designing Data Visualizations: Representing Informational Relationships
4. Ashutosh Nandeshwar, 2009, “Tableau Data Visualizaton Cookbook”, PACKT publishing.
5. Hadley Wickham , 2009, ggplot2: Elegant Graphics for Data Analysis
6. Alexandru C. Telea , 2007. “Data Visualization principles and practice” Second Edition, CRC Publications

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1. https://www.tableau.com/
2. https://www.tutorialspoint.com/tableau/index.htm
3. https://www.coursera.org/specializations/data-visualization
4. https://towardsdatascience.com/tableau-visualizations

Semester-III

22CAP305D Big Data Analytics 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course Objective

Enable the student

- To understand the evolution and architecture of Big Data
- To learn the virtualization concept of big data
- To learn the Hadoop framework in processing big data
- To understand the concepts of big data analytics
- To define the concept of data source integration for big data processing
- To learn Hadoop distributed file system

Course Outcomes (Cos)

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

1. Analyze the big data analytic techniques for useful business applications.
2. Implement the concept of virtualization and abstraction in analyzing big data
3. Analyze the HADOOP and Map Reduce technologies associated with big data analytics
4. Understand the fundamentals of various big data analysis techniques
5. Implement the integration of data sources in operationalizing Big Data
6. Implement the text analytics using Hadoop

Unit-I - Fundamentals of Big Data

The Evolution of Data Management Understanding the Waves of Managing Data- Defining Big Data - Big Data Management Architecture- The Big Data Journey -Big Data Types-Defining Structured Data-Defining Unstructured Data-Putting Big Data Together.

Unit-II - Big Data Stack

Basics of Virtualization - The importance of virtualization to big data -Server virtualization - Application virtualization - Network virtualization -Processor and memory virtualization - Data and storage virtualization

Unit-III - Hadoop

Hadoop - Hadoop Distributed File System - Hadoop MapReduce- The Hadoop foundation and Ecosystem.

Unit-IV - Big Data Analytics

Big Data Analytics-Text Analytics and Big Data-Customized Approaches for Analysis of Big Data.

Unit-V - Integrating Data Sources

Integrating Data Sources-Real-Time Data Streams and Complex Event Processing-Operationalizing Big Data.

Suggested Readings

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, 2013. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, New Delhi.
2. Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman, 2013. Big Data For Dummies, Wiley India,New Delhi.
3. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, 2012. Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, New Delhi.
4. Zikopoulos, Paul, Chris Eaton, 2011. Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, New Delhi.

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1. Www.oracle.com/bigdata
2. Www.planet-data.eu/sites/default/files/Big_Data_Tutorial_part4.pdf
3. Www.ibm.com/developerworks/data
4. Www.solacesystems.com
5. En.wikipedia.org/wiki/Big_data
6. www.sap.com/solution/big-data.html

NPTEL

1. https://nptel.ac.in/courses/110106072/
2. https://nptel.ac.in/courses/110106064/

Semester-III

22CAP305N Wireless Sensor Networks 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives

Enable the student

- To understand the basics of Ad-hoc & Sensor Networks
- To learn various fundamental and emerging protocols of all layers in ad-hoc network
- To study about the issues pertaining to major obstacles in establishment and efficient management of ad-hoc and sensor networks
- To understand the nature and applications of ad-hoc and sensor networks
- To understand various security practices and protocols of Ad-hoc and Sensor Networks
- To learn various protocols used in wireless sensor network

Course Outcomes (COs)

Upon completion of the course, students will be able to

1. Create a Sensor network environment for different type of applications
2. Design ad-hoc and sensor network architectures using QoS and Congestion control mechanisms
3. Apply appropriate routing algorithms for different network environments
4. Analyze the working of ad-hoc and sensor network for various applications
5. Deploy security mechanisms in the wireless ad-hoc and sensor networks
6. Compare the various protocols used in wireless sensor network

Unit I - Adhoc Networks Fundamentals & Communication Protocols

Fundamentals Of WLANs – IEEE 802.11 Architecture - Self Configuration and AutoConfiguration-issues in Ad-Hoc Wireless Networks – MAC Protocols for Ad-Hoc Wireless Networks – Contention Based Protocols - TCP Over Ad-Hoc Networks-TCP Protocol Overview TCP and MANETs – Solutions for TCP Over Ad-Hoc Networks

Unit II - Adhoc Network Routing and Management

Routing in Ad-Hoc Networks- Introduction -Topology based versus Position based Approaches Proactive Routing - DSDV, WRP, TBRPF Reactive Routing – DSR,AODV, Hybrid Routing Approach ZRP, CBRP- Location services - DREAM – Quorums based Location Service – Forwarding Strategies – Greedy Packet Forwarding, LAR.

Unit III - Sensor Network Communication Protocols

Introduction – Architecture - Single Node Architecture – Sensor Network Design Considerations Energy Efficient Design Principles for WSN‟s – Protocols for WSN – Physical Layer - Transceiver Design Considerations – MAC Protocols for wireless sensor network – IEEE 802.15.4 Zigbee – Link Layer and Error Control Issues - Routing Protocols – Gossiping and agent based unicast forwarding, Energy efficient unicast –Transport Protocols & QoS – Congestion Control Issues – Application specific Support – Target detection and tracking.

Unit IV - Sensor Network Management and Programming

Sensor Management - Topology Control Protocols and Sensing Mode Selection Protocols - Time Synchronization - Localization and Positioning – Operating Systems and Sensor Network Programming – Sensor Network Simulators- Case study: Industrial automation and tsunami early warning system with wireless sensor networks.

UNIT V - Adhoc and Sensor Network Security

Security in Ad-Hoc and Sensor Networks – Key Distribution and Management – Software based Anti-tamper Techniques – Water Marking techniques – Defense against Routing Attacks - Secure Adhoc Routing Protocols – Broadcast Authentication WSN Protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS.

Suggested Readings

1. Khan Shafiullah Et.Al, September 2021. “Wireless Sensor Networks Current status and Future Trends”, Taylor & Francis, , ISBN: 9781138582712
2. Rohtash Ghuriya, April 2015. “Wireless AdHoc and Sensor Networks”, Gazelle Book Services, , ISBN: 9789380090733
3. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, 2011. “Ad Hoc and Sensor Networks: Theory and Applications”, Second Edition, World Scientific Publishing,
4. C.Siva Ram Murthy and B.S.Manoj, 2011. “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education,.
5. TeiebZnati Kazem Sohraby, Daniel Minoli, 2010. “Wireless Sensor Networks: Technology, Protocols and Applications, Wiley, ISBN: 13 978-8126527304
6. Waltenegus Dargie, Christian Poellabauer, 2010. “Fundamentals of Wireless Sensor Networks Theory and Practice”, John Wiley and Sons,
7. Amiya Nayak,Ivan Stojmenovic,, 2010. “Wireless Sensor and Actuator Networks: Algorithm and Protocols for Scalable Coordination and Data communication”, John Wiley & Sons
8. Erdal Çayırcı, Chunming Rong, 2009. “Security in Wireless AdHoc and Sensor Networks”, John Wiley and Sons
9. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, 2008. Ad Hoc Mobile Wireless Networks, Auerbach Publications,.
10. C.K.Toh, 2007. “AdHoc Mobile Wireless Networks”, Pearson Education,
11. Holger Karl, Andreas willing, 2007. “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons,Inc..

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2. https://link.springer.com/chapter/10.1007/978-3-642-37949-9_5
3. https://**www.slideshare.net/victerpaul/28-routing-in-mobile-adhoc-networks**
4. https://onlinelibrary.wiley.com/doi/abs/10.1002/9780470516782
5. https://**www.mooc-list.com/course/wireless-communication-emerging-technologies-** coursera

NPTEL

1. https://nptel.ac.in/courses/106105160/

Semester-III

22CAP305S Software Metrics 4H - 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objective

Enable the student

- To understand the basic terminology and state fundamental facts about software metrics and process models.
- To identify the essential elements of a given metric or model, describe the interrelationships among its various elements
- To understand software process assessment cycles, complexity metrics and models.
- To measure and analyze customer satisfaction in development of software
- To know the techniques to improve the software process development
- To identify how to remove the defects in the software project

Course Outcomes (COs)

Upon Completion of this course, student will be able to

1. To analyze the importance of modeling and modeling languages
2. To apply the basic quality tools in software development
3. Analyze the software process metrics in the process of software testing
4. Implement function point metrics to measure software process improvement
5. Explain the business requirements pertaining to software development
6. Assess the software project using the metrics

Unit I - Introduction

Software quality-popular views-the role of the customer-software quality- Total quality management. Software development process models-the spiral model-iterative development process-The Cleanroom Methodology-Process Maturity Framework and Quality standards. Fundamentals of Measurement theory-Level of measurement-Reliability and validity-Measurement Errors

Unit-II - Applying the seven basic quality tools

Applying the seven basic quality tools in software development-Defect removal effectiveness-The Rayleigh model-Exponential distribution and reliability growth models-Quality management models

Unit-III - Process metrics for software testing

Process metrics for software testing-Complexity metrics and models-Metrics and lessons learned for object oriented projects-Availability metrics

Unit-IV - Measuring and analyzing

Measuring and analyzing customer satisfaction-Conducting in-process quality assessments

Unit-V - Software project assessments

Software project assessments-Dos and Don'ts of software process improvement-Using function point metrics to measure software process improvement-Concluding remarks

Suggested Readings

1. **Norman Fenton,** 2014, Software Metrics: A Rigorous and Practical Approach, Third Edition (Chapman & Hall/CRC Innovations in Software Engineering and Software Development Series)
2. Stephen H.Kan, 2013. Metrics and Models in Software Quality Engineering, Second Edition, Pearson India.
3. **C. Ravindranath Pandian,** 2003. Software Metrics: A Guide to Planning, Analysis, and Application,

Websites

1. https://**www.digimat.in/nptel/courses/video/106101061/L21.html**

NPTEL

1. http://www.nptelvideos.in/2012/11/software-engineering.html

Semester-III

22CAP305W Internet of Things 4H–4C

Instruction Hours /week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

Enable the student

- To Understand the Introduction to IoT and Architectural Overview of IoT
- To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service)
- To Understand the communication technologies in IoT Know the IoT protocols and web of things
- To Know the various applications of IoT
- To know about Cloud of Things
- To integrate the IoT in various applications

Course Outcomes(COs)

Upon completion of the course, students will be able to :

1. Understand building blocks of Internet of Things and characteristics.
2. Understand IoT protocols, Web of Things and Integrating IOT.
3. Understand the application areas of IOT ·
4. Learn the various cloud service providers
5. Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
6. Learn about communication technologies used in IoT, Web of Things, Structural models and applications of IoT

Unit I – Introduction

Internet Layers - Protocols - Packets - Services - Performance parameters - Peer-to-peer networks Sensor networks - Multimedia - IOT Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNAof IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security.

Unit II - IoT Protocols

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – point-to-point protocols - Ethernet protocals - cellular Internet access protocol - Machine-to-machine protocol - Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security.

Unit III - Web of Things

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud

Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

Unit IV - Integrating IoT

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things Network Dynamics: Population Models – Information Cascades - Network Effects - Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon.

Unit V – Applications

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging Case studies: Sensor body-area-network and Control of a smart home.

Suggested Readings

1. Olivier Hersent, Omar Elloumi and David Boswarthick, 2012. The Internet of Things:Applications to the Smart Grid and Building Automation . Wiley.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, 2012. The Internet of Things – Keyapplications and Protocols. Wiley.
3. Honbo Zhou, 2012. The Internet of Things in the Cloud:A Middleware Perspective-–CRC Press .
4. Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.), 2011. Architecting the Internet of Things– Springer.
5. David Easley and Jon Kleinberg , 2010. Networks, Crowds, and Markets: Reasoning Abouta Highly Connected World , CambridgeUniversity Press.

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2. https://**www.i-scoop.eu/internet-of-things-guide**
3. https://iot-analytics.com

NPTEL

1. https://nptel.ac.in/courses/106105166/
2. https://nptel.ac.in/courses/106105195/
3. https://swayam.gov.in/nd1_noc19_cs65/preview

Semester-III

22CAP305DS Deep Learning 4H – 4C

Instruction Hours /week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

Enable the student

- To understand the basic ideas and principles of Neural Networks
- To design the feed forward neural networks for real world problems
- To apply the concept of CNN for image classification
- To apply RNN methods for image classification using the tools like TensorFlow and Keras
- To appreciate the use of Deep Learning models for real world Applications
- To understand and implement Deep Learning Architectures

Course Outcomes(COs)

Upon completion of the course, students will be able to :

1. Understand the basic ideas and principles of Neural Networks
2. Apply feed forward neural networks for real world problems.
3. Analyze different deep learning models in Image related projects.
4. Design and implement deep learning applications using RNN.
5. Understand the role of deep learning in machine learning applications and get familiar with the use of TensorFlow/Keras in deep learning applications.
6. Understand a wide variety of learning algorithms and apply to solve real world problems.

Unit I- Introduction to Neural Networks

Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

Unit II- Feed Forward Neural Networks

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training.

Unit III -Convolution Neural Networks

Nestors Accelerated Gradient Descent – Regularization – Dropout. CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

Unit IV- Recurrent Neural Networks

RNN, LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM- Image Segmentation – Object Detection – Automatic Image Captioning– Image generation with Generative Adversarial Networks – Video to Text with LSTM Models.

Unit V- Case Studies Using CNN & RNN

Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Suggested Readings

1. Francois Chollet. 2018. Deep Learning with Python, Manning Publications, First Edition.
2. Ragav Venkatesan, Baoxin Li. 2018. Convolutional Neural Networks in Visual Computing, CRC Press, First Edition.
3. Navin Kumar Manaswi. 2018. Deep Learning with Applications Using Python, A press, First Edition.
4. Phil Kim. 2017. Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence, A Press, Third Edition.
5. Ian Good Fellow, Yoshua Bengio and Aaron Courville. 2017. Deep Learning, MIT Press, First Edition.
6. Joshua F. Wiley. 2016. Deep Learning Essentials, Packt Publications, First Edition.

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1. www.nptel.ac.in/courses/106/106/106106184/
2. www.nptel.ac.in/courses/106/106/106106201/
3. www.nptel.ac.in/courses/106/105/106105215/
4. www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s191-introduction- to-deep-learning-january-iap-2020/
5. www.kaggle.com/learn/intro-to-deep-learning

Semester-III

22CAP311 PHP5/MySQL -Practical 5H - 2C

Instruction Hours / week: L: 0 T: 0 P: 5 **Marks:** Internal: **40** External: **60** Total: **100**

End Semester Exam: 3 Hours

Course Objectives

To help the students

- To get hands-on experience in scripting, debugging, testing.
- To establish a working environment for PHP web page development
- To learn to create dynamic interactive pages with PHP.
- To learn to manipulate files with PHP.
- To learn to use SQL to output reports with MySQL
- To write pseudo code for an application

Course Outcomes (Cos)

Upon completion of this course, student will be able to

1. Implement regular expressions in PHP programming including modifiers, operators, and meta characters.
2. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
3. Analyze and solve various database tasks using the PHP language.
4. Create server side web applications using PHP and MySQL.
5. Analyze the structure of an E-Mail message
6. Develop the files and directories management operation

List of Programs

1. Design an online loan application form.
2. Design a form to submit your resume in net.
3. Design an application for Library Management System
4. Design form for online reservation in air ways.
5. Design form for online shopping
6. Design an application for creating an online Advertisement.
7. Design an application for student Information System.
8. Design an application to display cookies information.
9. Write a program for display environment variables in MySQL.
10. Write a program to count web page hits.
11. Design an email form that validates the inputs, produces errors when inputs are typed incorrectly, and send an email to you when submitted.
12. Design an application to upload multiple files

Suggested Readings

1. Julie Meloni. 2012. Sams Teach Yourself PHP, MySQL and Apache All in One, 5th Edition, Pearson Education India.
2. Baron Schwartz, Peter Zaitsev, Vadim Tkachenko. 2012. High Performance MySQL: Optimization, Backups, 3rd Edition, O'REILLY.
3. Luke welling, Laura Thomson. 2010. PHP and MySQL Web Development, 4th Edition, Pearson Education.
4. Dave W.Mercer, Allan Kent, Steven D.Nowicki, Davd Mercer, Dan Squie, Wankyu Choi. 2009. Beginning PHP5. Wiley India (P) Ltd, New Delhi
5. Paul Dubois. 2006. MySQL, 1st Edition, Tech Media, New Delhi.
6. Tim Converse & Joyce Park with Clark Morgan. 2006. PHP5 & MySQL Bible, 1st Edition, John Wily, India.

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2. https://askubuntu.com/questions/958119/how-to-enable-php5-mysql-in-ubuntu-16-04-trough-cli
3. https://packages.debian.org/jessie/php5-mysql

Semester-III

22CAP312 .NET Programming – Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective

Enable the student

- Create windows forms using arrays and flow control statements.
- Learn to use the classes and namespaces in the .NET Framework class library.
- Develop Web Applications using Microsoft ASP.NET programming.
- Learn to use Basic windows controls using Visual Basic.Net
- Understand the concept of Multiple Document Interface
- Learn the architecture of .NET

Course Outcomes (Cos)

Upon completion of the course, students will be able to

1. Develop Windows based applications using Visual Basic.Net
2. Implement ADO.Net concept in VB.Net and ASP.Net applications
3. Create server side web applications using ASP.NET
4. Analyze the concept of data sources and data bound controls in VB.NET and ASP.NET
5. Demonstrate the working of ADO.Net controls for developing ASP.Net web applications
6. Design the application using ASP.NET Web Server Control

List of Programs

VB.Net

1. Write a Program to perform various string manipulation functions.
2. Using windows application form, create a form, place controls and manipulate data.
3. Write a program to create inventory control using class library.
4. Write a program to create Web Services Using Vb.Net.
5. Write a program to create a screen saver using controls
6. Create an ActiveX program with simple example.
7. Using windows Application: Design Employee Details, use Sql Server as back end and alsouse checked list box.

ASP.Net

1. Write a program to create an on-line quiz using content page holder.
2. Write a program to retrieve Cookies information.
3. Write a program to count web page hits.
4. Write program to retrieve environment variables browser capability information.
5. Write a program for database connectivity to retrieve student information

Suggested Readings

1. Shirish Chavan. 2007. Visual Basic.Net, 1st Edition, Pearson Education, New Delhi.
2. Duncan Mackenzie Kent Sharkey, 2006. Sams Teach yourself Visual Basic.JNet, 1stEdtion,McGraw Hill, NewDelhi.
3. Bill Evjen, Scott Hanselman, Devin Rader, Farhan Muhammad and S.Srinivasa Sivakumar, 2006. Professional ASP.net 2.0, Special Edition.
4. Evangelos Petroutsos, 2005. Mastering Visual Basic.Net, BPB Publications, New Delhi.
5. Dave Mercer, ASP.Net Beginner's Guide, 2003. 2nd Edition McGraw Hill, New Delhi.

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1. https://**www.w3resource.com/csharp-exercises/**
2. https://**www.guru99.com/asp-net-tutorial.html**
3. https://**www.oreilly.com/library/view/net-programming-a/0130669458/**

22CAP313D Data Mining and Data Warehousing – Practical **Semester-III 4H - 2C**

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objectives
Enable the student

- To gain the knowledge of the concepts and techniques in data mining
- To understand the data mining functionalities and pattern classification.
- To understand the cleaning and clustering process of data mining.
- To gain the knowledge of data warehouse architecture in data mining process
- To know about the Multimedia database
- To know about data warehouse

Course Outcomes (Cos)
Upon completion of this course, student will be able to :

1. To understand the data mining process of voluminous data using OLAP
2. To implement the preprocessing concept in data mining applications
3. To apply the data mining algorithms on big data to extract useful data
4. To implement data mining techniques for complex data types
5. To implement Decision Support System concept in data mining for developing intelligence business applications
6. To apply the web data mining

List of Programs

1. Use the following learning schemes, with the default settings to analyze the weather data (in weather.arff). For test options, first choose "Use training set", then choose "Percentage Split" using default 66% percentage split. Report model percent error rate
2. Using iris dataset preprocess and classify it with J4.8 and Naïve Bayes Classifier.examine the tree in the Classifier output panel
3. Using the datasets *ReutersCorn-Train* and *ReutersGrain-Train*. Classify articles using binary attributes and word count attributes.
4. Apply any two association rule based algorithm for the supermarket analysis
5. Using weka Experimenter perform comparison analysis of J48, oneR and ID3 for vote dataset
6. Using Weka Experimenter perform comparison analysis of Naïve Bayes with different datasets
7. Apply ZeroR, OneR, and J48, to classify the Iris data in an experiment using 10 train and test runs, with 66% of the data used for training and 34% used for testing.
8. Using Weka Knowledge flow Sett up a flow to load an ARFF file (batch mode) and perform a cross-validation using J48 (WEKA's C4.5 implementation).

9. Draw multiple ROC curves in the same plot window, using J48 and RandomForest as classifiers.
10. Use any three clustering algorithm on Vehicle data set and find best among them
11. Perform Preprocessing, feature selection and apply any one of the algorithm each from clustering, Association and classification to find their performance
12. Examine the performance of different filters for the breast cancer dataset

Suggested Readings

1. Jiawei Han and Micheline Kamber, 2011. Data Mining Concepts and Techniques, 3rd Edition, Elsivier,India (Unit I, III, IV, V)
2. Paulraj Ponniah, 2008. Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals, John Wiley & Sons, New Delhi.
3. G.K.Gupta, 2006, Introduction to Data Mining with Case Studies, Prentice Hall India, New Delhi (Unit – IV)
4. Soman.K.P, Shyam Divakar and V. Ajay, 2008. Insight to Data Mining- Theory and Practical, Prentice Hall India, New Delhi. (Unit – II).
5. Gupta.G.K., 2006. Introduction to Data Mining with Case Studies, Prentice Hall India, New Delhi .

Websites

1. www.wikipedia.org/wiki/Data_mining
2. www.anderson.ucla.edu/faculty/jason.frand/teacher/technologies/palace/datamining.ht
3. www.thearling.com/text/dmwhite/dmwhite.htm

Semester-III

22CAP313N Network Simulator - Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives

Enable the student

- Understand the concepts and terminology associated with SNMP and TMN
- Understand the working of routing protocol in complex computer networks
- Gain knowledge the internal architecture of routers
- Understand the fundamentals and requirements for packet routing in computer communication network.
- Analyze the security mechanism in Computer routing process
- Understand the design metrics

Course Outcomes (Cos)

Upon completion of this course, student will be able :

1. To solve the problems in computer network system management
2. To analyze the challenges in the implementation of ATM networks
3. To implement SNMP Model in the management of computer networks
4. To configure routers using computer network software tools
5. To implement service level agreement in Computer Network management systems
6. To know the Network Management Tools and Systems

List of Programs

1. Simple router configuration.
2. Access and utilize the router to set basic parameters.
3. Connect, configure, and verify operation status of a device interface.
4. Implement static and dynamic addressing services for hosts in a LAN environment.
5. Identify and correct common problems associated with IP addressing and host configurations.
6. Describe basic routing concepts (including: packet forwarding, router lookup process).
7. Configure, verify, and troubleshoot RIPv2.
8. Perform and verify routing configuration tasks for a static or default route given.
9. Configure, verify and troubleshoot DHCP and DNS operation on a router.
10. Configure and verify a PPP connection between routers.

Suggested Readings

1. Mani Subramanian, 2012. Network Management Principles and Practice, 2nd Edition, Pearson Education Asia Pvt. Ltd.
2. James D. Mc CABE, 2010. Network Analysis, Architecture and Design, 3rd Edition, Morgan Kaufmann Publishers.
3. William Stallings, 2002. SNMP, SNMPv2, SNMPv3 and RMON 1 and 2, 3rd Edition, Pearson Education Asia Pvt. Ltd.

Websites

1. https://**www.cbtnuggets.com/blog/career/career-progression/5-best-network-simulators-**for-cisco-exams-ccna-ccnp-and-ccie
2. https://**www.imedita.com/blog/top-10-list-of-network-simulation-tools/**

Semester-III

22CAP313S Software Development - Practical Using Moodle 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objective

Enable the student

- To design, select and apply the most appropriate software engineering process for developing any software project
- To implement planning for a software project and identify the risks in software planning.
- To analyze the software requirements for developing any software.
- To understand the importance of negotiation, effective work habits, leadership in the software development process.
- To identify the risks involved in software project management
- To know the organization structure to develop the software project

Course Outcomes (Cos)

Upon Completion of this course, the student will be able to

1. Implement the concept of software effort estimation in developing software project.
2. Develop a responsible attitude towards the use of computer as well as the technology.
3. Evaluate the risks during the development of software projects
4. Understand the organization behavior in software project management.
5. Implement team management process in developing quality software
6. Monitor the software project management in various ways such as cost control, performance control, etc.,

List of Programs

Prepare a more detailed, organized and easy-to-read documentation, for any application software, which should describe the following using Moodle tool:

1. User Requirement Documentation (USD)
2. Requirement Analysis Documentation. (RAD)
3. User Interfaces Specification. (UIS)
4. Object Oriented Design (OOD) or Low Level Design (LLD)
5. Code Documentation (CD)
6. Testing Documentation (TD)
7. User's Guide (UG)

Suggested Readings

1. Kelkar, 2012. "Software Project Management", 3rd edition, Prentice Hall India,2012
2. Bob Hughes and Mike Cotterell, 2011. Software Project Management, 5th Edition, New Delhi: Tata McGraw Hill
3. Royce, 2000. Software Project Management, 1st Edition, New Delhi: Addisions Wesley.

Websites

1. https://moodle.org/mod/forum/discuss.php?d=332177
2. https://docs.moodle.org/dev/Coding
3. https://docs.moodle.org/38/en/About_Moodle

Semester-III

22CAP313W Web Programming Essential - Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives

Enable the student

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice embedded dynamic scripting on client side Internet Programming
- To understand and practice web development techniques on client-side
- To explain concept of Java Script for developing web applications
- To explain the working of LAMP server for executing PHP Applications
- To know about AJAX and JQuery

Course Outcomes (Cos)

Upon Completion of this course, the student will be able to

1. Acquire knowledge about functionalities of world wide web
2. Explore markup languages features and create interactive web pages using them
3. Learn and design Client side validation using scripting languages
4. Acquire knowledge about Open source JavaScript libraries
5. Able to design front end web page and connect to the back end databases.
6. Apply JQuery in the web page development

List of Programs

1. Create a web page with the following using HTML5
   (i) To embed an image map in a web page
   (ii) To fix the hot spots
   (iii) Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Implement Client Side Scripts for Validating Web Form Controls using JavaScript.
4. Designing Quiz Application Personal Information System/ Using JavaScript
5. Write a JavaScript for Loan Calculation.
6. Develop and demonstrate a HTML file that includes JavaScript that uses functions for the following problems:
   a) Parameter: A stringOutput: The position in the string of the left-most vowel
   b) Parameter: A numberOutput: The number with its digits in the reverse order

7. Develop PHP program using Arrays, control structures, looping structures and Form Handling.
8. Using PHP and MySQL, develop a program to accept book information viz. Accessionnumber, title, authors, edition and publisher from a web page and store the information ina database and to search for a book with the title specified by the user and to display the search results with proper headings.
9. Write an AJAX program for parsing a JSON file and formatting the output. 10. Develop a webapplication for Airline Reservation System using PHP & AJAX.

Suggested Readings

1. Thomas A Powell, Fritz Schneider, 2014 "JavaScript: The Complete Reference", Third Edition,Tata
2. McGraw Hill, 2013. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media
3. Achyut S Godbole and Atul Kahate, 2012. "Web Technologies", Second Edition, Tata McGraw Hill.
4. Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, 2011. "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education.

Websites

1. https://lecturenotes.in/subject/141/web-programming-wp
2. https://**www.smartzworld.com/notes/we**b-**programming-pdf-notes-wp-pdf-notes/**
3. https://**www.w3schools.com/whatis/whatis_es5.asp**
4. https://**www.w3schools.com/whatis/whatis_JSON**
5. https://**www.edx.org/course/pro**gramming-for-the-PHP

Semester-III

22CAP313DS Data Visualization- Practical 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

Enable the student

- To know the importance of data Visualization in the world of Data Analytics and Prediction
- To know the important libraries in Tableau
- To get equipped with Tableau Tool
- To create charts using Tableau Tool
- To aggregate data using Tableau Tool
- To visualize data as maps and forecast future data using Tableau Tool

Course Outcomes (COs)

Upon completion of this course students will be able to:

1. Visualize data through seven stages of data analysis process
2. Explore hybrid types of data visualization
3. Understand various stages of visualizing data
4. Create charts using Tableau Tool
5. Aggregate data using Tableau Tool
6. Visualize data as maps and forecast future data using Tableau Tool

List of Programs

1. Connect to data Sources
2. Create Univariate Charts
3. Create Bivariate and Multivariate charts
4. Create Maps
5. Calculate user-defined fields
6. Create a workbook data extract
7. Save a workbook on a Tableau server and web
8. Export images, data.

Suggested Readings:

1. Joshua N. Millign, 2019. “Learning Tableau ”, Third Edition- Packt publications Student Activity
2. Cole Nussbaumer Knaflic ,2014. “Storytelling with Data: A Data Visualization Guide for Business Professionals
3. Noah Iliinsky, Julie Steele , 2011, Designing Data Visualizations: Representing Informational Relationships
4. Ashutosh Nandeshwar, 2009, “Tableau Data Visualizaton Cookbook”, PACKT publishing.
5. Hadley Wickham , 2009, ggplot2: Elegant Graphics for Data Analysis
6. Alexandru C. Telea , 2007. “Data Visualization principles and practice” Second Edition, CRC Publications

Websites

1. https://www.tableau.com/
2. https://www.tutorialspoint.com/tableau/index.htm
3. https://www.coursera.org/specializations/data-visualization
4. https://towardsdatascience.com/tableau-visualizations

Semester-III

22CAPOE301 Robotics 3H-2C

Instruction Hours / week: L: 3 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives

Enable the student

- Learn the concepts of RPA, its benefits, types and models
- Gain the knowledge in application of RPA in Business Scenarios
- Identify measures and skills required for RPA
- Adopt to the implementations of Automation
- Able to process information and draw inference
- Understand the concepts of robot skills

Course Outcomes (COs)

Upon completion of this course students will be able to:

1. Demonstrate the benefits and ethics of RPA K1, K2
2. Understand the Automation cycle and its techniques K2
3. Draw inferences and information processing of RPA K3, K4
4. Understand the Automation concepts
5. Implement & Apply RPA in Business Scenarios K5
6. Analyze on Robots & leveraging automation

Unit I - Introduction

Introduction to RPA - Overview of RPA - Benefits of RPA in a business environment - Industries & domains fit for RPA - Identification of process for automation - Types of Robots - Ethics of RPA & Best Practices - Automation and RPA Concepts - Different business models for implementing RPA - Centre of Excellence – Types and their applications - Building an RPA team - Approach for implementing RPA initiatives.

Unit II - Automation

Role of a Business Manager in Automation initiatives - Skills required by a Business Manager for successful automation - The importance of a Business Manager in automation - Analyzing different business processes - Process Mapping frameworks - Role of a Business Manager in successful implementation – Part 1 - Understanding the Automation cycle – First 3 automation stages and activities performed by different people

Unit III - Automation Implementation

Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people - Role of a Business Manager in successful completion – Part 2 - Activities to be performed post-implementation - Guidelines for tracking the implementation success - Metrics/Parameters to be considered for gauging success - Choosing the right licensing option - Sending emails - Publishing and Running Workflows

Unit IV – Robot

Ability to process information through scopes/systems - Understand the skill of information processing and its use in business - Leveraging automation - Creating a Robot - New Processes. Establish causality by variable behavior - Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable - Leveraging automation for this skill - Robot & new process creation.

Unit V – Robot Skill

Inference from snapshots of curated terms – Omni-source data curation - Multisource trend tracking - Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) - Leveraging automation for this skill – Robot creation and new process creation for this skill.

Suggested Readings

1. Tom Taulli, February 2020. “The Robotic Process Automation Handbook” Apress , Reference Books 1 Steve Kaelble” Robotic Process Automation” John Wiley & Sons, Ltd.
2. Alok Mani Tripathi, March 2018. “Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool”, Packet Publishing Limited

Websites

1. https://www.tutorialspoint.com/uipath/uipath_robotic_process_automation_introduction.htm
2. https://www.javatpoint.com/rpa 3 https://onlinecourses.nptel.ac.in/noc19_me74/preview

Semester–III

22CAU391	**Internship**	**0H –2C**

Instruction Hours / week: L: 0 T: 0 P: 0 **Marks:** Internal: **100** External: 0 Total: **100**
End Semester Exam: 3 Hours

Semester-IV

22CAP491	**Project and Viva Voce**	**14C**

Instruction Hours / week: L: 0 T: 0 P: 0 Marks: Internal: 80 External: 120 Total: 200

End Semester Exam: 3 Hours