M.Sc. COMPUTER SCIENCE CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2023 – 2024)



DEPARTMENT OF COMPUTER SCIENCE FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

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. Tamil Nadu, India Phone No. 0422-2980011 – 14 Fax No. 0422-2980022-23 E mail ID: info@kahedu.edu.in Web: www.kahedu.edu.in



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University) (Established Under Section 3 of UGC Act, 1956)

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT POST – GRADUATE PROGRAMMES

(REGULAR PROGRAMME)

REGULATIONS

(2023)

CHOICE BASED CREDIT SYSTEM (CBCS)

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FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT POST-GRADUATE PROGRAMMES (M.Sc., M.Com.)

REGULAR MODE CHOICE BASED CREDIT SYSTEM (CBCS)

REGULATIONS - 2023

The following regulations are effective from the academic year 2023 -2024 and are applicable to the candidates admitted in Post Graduate (PG) Degree programmes in the Faculty of Arts, Science, Commerce and Management, Karpagam Academy of Higher Education (KAHE).

1 PROGRAMMES OFFERED, MODE OF STUDY AND ADMISSION REQUIREMENTS

1.1 P.G. PROGRAMMES OFFERED

The various P.G. Programmes offered by the KAHE are listed in the table below.

S. No.	Programme Offered
1	M.Sc. Biochemistry
2	M.Sc. Microbiology
3	M.Sc. Biotechnology
4	M.Sc. Physics
5	M.Sc. Chemistry
6	M.Sc. Mathematics
7	M.Sc. Computer Science
8	M.Com.
9	MA English

1.2 MODE OF STUDY

Full-Time

All programmes are offered under Full-Time Regular mode. Candidates admitted under 'Full-Time' should be present in the KAHE during the complete working hours for curricular, co-curricular and extra-curricular activities assigned to them.

1.3 ADMSSION REQUIREMENTS (ELIGIBILITY)

A candidate for admission to the first semester Master's Degree Programme shall be required to have passed an appropriate Degree Examination of this Karpagam Academy of Higher Education or any other University accepted by the KAHE as equivalent thereto. Admission shall be offered only to the candidates who possess the qualification prescribed against each course as given in the table below.

S. No.	Name of the Programme Offered	Eligibility
1	M.Sc. Biochemistry	B.Sc. Degree with Biology / Biochemistry / Chemistry / Biotechnology / B.F.Sc. / Polymer Chemistry / Microbiology/ Zoology / Botany / Plant Science / Plant Biotechnology / Animal Science / Animal Biotechnology / B.Pharm / Industrial Chemistry / Applied Microbiology / Medical Microbiology / Human Genetics / Medical Genetics / Molecular Biology / Genetics Technology / Environmental Science / Environment Biotechnology / Genetics Engineering / Bioinformatics / Plant Biology & Biotechnology / Animal Cell & Biotechnology / Nutrition & Dietetics
2	M.Sc. Microbiology	B.Sc. Microbiology / Applied Microbiology / Industrial Microbiology / Medical Microbiology / Botany / Zoology / Biology / Biotechnology / Molecular Biology / Genetic Engineering / Biochemistry / Agriculture / Forestry / Medical Lab Technology / Life Sciences

QUALIFICATIONS FOR ADMISSION

3	M.Sc. Biotechnology	B.Sc. Degree with Biology / Biochemistry / B.Sc Biology with Chemistry Ancillary / B.F.Sc. / Microbiology / Zoology / Botany / Plant Science /Plant Biotechnology / Botany / Plant Science /Plant Biotechnology / Animal Science /Animal Biotechnology / B.Pharm / Applied Microbiology / Medical Microbiology / Human Genetics / Medical Genetics / Molecular Biology / Genetics / Environmental Science / Environment Biotechnology / Genetics Engineering / Bioinformatics / Plant Biology & Biotechnology / Animal Cell & Biotechnology / Agriculture / B.Tech (Biotech)
4	M.Sc. Physics	B.Sc. Physics, B.Sc. Physics (CA) / B.Sc. Applied science
5	M.Sc. Chemistry	B. Sc. Chemistry, Industrial Chemistry, Polymer Chemistry
6	M.Sc. Mathematics	B.Sc. Mathematics / B.Sc. Mathematics with Computer Applications
7	M.Sc. Computer Science	B.Sc. Computer Science / Computer Technology / Information Technology / Electronics / Software Systems / BCA/ B.Sc. Applied Sciences
8	M.Com	B.Com./BCom.(CA)/B.Com(PA)/B.Com(Fina nce&Insurance)/ B.Com.(e-Commerce)/ B.Com.(IT) /B.B.M. /B.B.M.(CA) /B.B.A./B.B.A (CA) / B.Com (CS), B.A. Co- Operation / Bachelor's Degree in Bank Management/ B.A. Economics / B. Com Financial Analytics/ B. Com International Accounting and Finance
9	MA English	BA (English)/Any UG degree with Part II – English for four semester.

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
M.Sc., M.Com., MA	4	8

2.2 Each semester normally consists of 90 working days or 450 Instructional hours for full-time mode of study. Examination shall be conducted at the end of every semester for the respective courses.

3. CHOICE BASED CREDIT SYSTEM

3.1 All programmes are offered under Choice Based Credit System with a total credit ranges from 87 to 93 for the PG programmes.

3.2 Credits

Credits means the weightage given to each course of study by the experts of the Board of Studies concerned.

4. STRUCTURE OF THE PROGRAMME

Every Programme will have a curriculum and syllabus consisting of core courses, elective courses, open elective, Internship and project work.

a. Core course

Core course consists of theory and practical and the examinations shall be conducted at the end of each semester.

b. Elective course

Elective courses are to be chosen with the approval of the Head of Department concerned from the list of elective courses mentioned in the curriculum.

c. Project Work

The candidates shall undertake the project work in the Fourth Semester either in the Department concerned or in Industries, Research Institute or any other Organizations (National / International) and the project report has to be submitted at the end of the fourth semester.

In case 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 where the project work carried out.

d. Value Added Courses

Courses of varying durations but not less than 30 hours which are optional and offered outside the curriculum that add value and help the students in getting placement. Students of all programmes are eligible to enroll for the Value Added Courses. The student shall 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 student shall undergo 15 days internship in the end of second semester. Internship report will be evaluated and marks will be awarded in the third semester. Students have to earn 2 credits for the Internship.100 marks is awarded for Internship through Continuous Internal Assessment.

f. Open Elective

He / She may select one of the open elective courses from the list given below offered by other departments in the third semester. Students have to earn 02 credits for this course. (The student cannot select a course offered by the parent department).

S.No.	Name of the offering	Course Code	Name of the Course
	Department		
1	English	23EGPOE301	English for Competitive
			Examinations
2	Commerce	23CMPOE301	Personal Finance and
			Planning
3	Management	23MBAPOE301	Organizational Behavior
4	Computer Applications	23CAPOE301	Robotics Process Automation
5	Computer Science	23CSPOE301	Cyber Forensics
6	Mathematics	23MMPOE301	Coding theory
7	Physics	23PHPOE301	Material Characterization
		23PHPOE302	Numerical Methods and
			Programming
8	Chemistry	23CHPOE301	Chemistry in Everyday Life
9	Microbiology	23MBPOE301	Fermentation Technology
10	Biochemistry	23BCPOE301	Nutrition and Dietetics
11	Biotechnology	23BTPOE301	Sericulture

Online Course

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 to 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 credits minimum 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 maximum of 100 marks. Out of which 40 marks are for Continuous Internal Assessment (CIA) and 60 marks for End Semester Examinations (ESE).

(ii) Maximum Marks for Project work

S. No	Programme	Maximum Marks	CIA	ESE
1	M.Sc., M.Com., MA	200	80	120

7. 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 mentor throughout their period of study. Faculty mentors shall advise the students and monitor their behavior and academic performance. Problems if any shall be counseled by them periodically. The Faculty mentor is also responsible to inform the parents of their wards progress. 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 the **clause 7** of this regulation.

b. ONLINE COURSE COORDINATOR

To help students in planning 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 which the students can select for their programme from the available online courses offered by different agencies periodically and inform the same to the students. Further, the coordinators shall advice the students regarding the online courses and monitor their course.

8. CLASS COMMITTEE

Every class shall have a Class Committee consisting of teachers of the class concerned, student representatives (Minimum two boys and 2 girls of various capabilities and Maximum of 6 students) and the concerned HoD / senior faculty as a Chairperson. The objective of the class committee Meeting is all about the teaching – learning process. Class Committee shall be convened at least once in a month. The functions of the Class Committee shall include

- **1.** The class committee shall be constituted during the first week of each semester.
- 2. The Class Committee of a particular class of any department is normally 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 Dean of the Faculty.
- **3.** The HoD/Chairperson of the Class committee is authorized to convene the meeting of the class committee.
- **4.** The respective Dean of the Faculty has the right to participate in any Class committee meeting.
- 5. The Chairperson is required to prepare the minutes of every meeting, and submit the same to the Dean concerned 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.
- **6.** Analyzing and solving problems experienced by students in the class room and in the laboratories.
- **7.** Analyzing the performance of the students of the class after each test and finding the ways and means to improve the performance.

9. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or group shall have a "Course Committee" comprising all the teachers handling the common course with one of them nominated as course coordinator. The nomination of the course coordinator shall be made by the Dean depending upon whether all the teachers handling the common course belong to a single department or to various other departments. The 'Course Committee' shall meet in order to arrive at a common scheme of evaluation for the tests to ensure a uniform evaluation of the tests. If feasible, the course committee shall prepare a common question paper for the Internal Assessment test(s).

10. REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

- **a.** Ideally every student is expected to attend all classes and secure 100% attendance. However, in order to allow for certain unavoidable circumstances, the student is expected to attend at least 75% of the classes and the conduct of the candidate should be 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 University / District / State / National / International level sports or due to participation in Seminar / Conference / Workshop / Training Programme / Voluntary Service / Startup Activity / 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 examination 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 to the Dean concerned. However, the candidate has to pay the prescribed condonation fee to KAHE.

c. However, a candidate who has secured attendance less than 65% in the current semester due to any reason shall not be permitted to appear for the current semester examinations. But he/she will be permitted to appear for his/her supplementary examinations, if any and he/she has to re-do the same semester with the approval of the Dean, Students Affairs and Registrar.

11. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

11.1 Every Faculty is required to maintain an **Attendance and Assessment Record (Log book)** which consists of attendance of students marked for each lecture/practical/ project work class, the test marks and the record of class work (topic covered), separately for each course. This should be submitted to the HoD once in a week for checking the syllabus coverage, records of test marks and attendance. The HoD shall sign with date after due verification. The same shall be submitted to respective Dean once in a fortnight. After the completion of the semester the HoD should keep this record in safe custody for five years as records of attendance and assessment shall be submitted for inspection as and when required by the KAHE/any other approved body.

11.2 **Continuous Internal Assessment (CIA)**: The performance of students in each course will be continuously assessed by the respective faculty. The Retest will be conducted and considered based on the requirements and recommendations by the Head of the Department. The guidelines for the Continuous Internal Assessment (CIA) are given below:

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

Theory Courses

*Evaluated by two faculty members of the department concerned. Distribution up of marks for one Journal paper analysis: Subject matter 5 marks, Communication/PPT Presentation 4 marks, Visual aid 2 marks and Question and Discussion 4 marks

Practical Courses

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

* *Viva - voce* conducted during model practical examination.

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

11.3 Pattern of Test Question Paper

Instruction	Remarks
Maximum Marks	50 marks
Duration	2 Hours
Part – A	Objective type (20x1=20)
Part - B	Short Answer Type $(3 \times 2 = 6)$
Part - C	3 Eight marks questions 'either – or' choice (3 x 8 = 24 Marks)

11.4 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 or equal to 75	0

12. ESE EXAMINATIONS

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

Pattern of ESE Question Paper

Instruction	Remarks
Maximum Marks	60 marks for ESE
Duration	3 hours (¹ / ₂ Hr for Part – A Online & 2 ¹ / ₂ Hours for Part – 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 six 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.,

Instruction	Remarks
	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)
Part - C	Question No.26. One Ten marks Question $(1 \times 10 = 10 \text{ Marks})$

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

	6
Experiments	: 40 Marks
Record	: 10 Marks
Viva-voce	: 10 Marks
Total	: 60 Marks

Record Notebooks for Practical Examination

Candidate 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 failures in Practical Examination, the marks awarded for the Record at the time of first appearance of the Practical Examination shall remain the same at the subsequent appearance also by the candidate.

12.3. Evaluation of Project Work

- 12.3.1 The project shall carry a maximum marks as per clause 6 (ii). ESE will be a combined evaluation of Internal and External Examiners.
- 12.3.2 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)
 - Results (Analysis of Data) and Discussion (Interpretat Summary References

- 12.3.3 The evaluation of the project will be based on the project report submitted and *Viva-Voce* Examination by a team consisting of the supervisor, who will be the Internal Examiner and an External Examiner who shall be appointed by the COE. In case the supervisor is not available, the HoD shall act as an Internal Examiner.
- 12.3.4 If a candidate fails to submit the project report on or before the specified date given by Examination Section, the candidate is deemed to be 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 the project report within 30 days from the date of declaration of the results. For this purpose the same Internal and External examiner shall evaluate the resubmitted report.

12.3.5 Copy of the approved project report after the successful completion of *viva voce* examinations shall be kept in the KAHE library.

13. PASSING REQUIREMENTS

- 13.1 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 in each course is 50 out of 100 marks (Sum of the marks in CIA and ESE examination).
- 13.2 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 examination is conducted for the same till he/she secures a pass both in CIA and ESE (vide Clause 2.1).
- 13.3 Candidate failed in CIA will be permitted to improve CIA marks in the subsequent semesters by writing tests and by re-submitting assignments.
- 13.4 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 a pass in ESE.
- 13.5 A candidate who is absent in ESE in a Course / Practical / Project work after having enrolled for the same shall be considered to have Absent (AAA) in that examination.

14. IMPROVEMENT OF MARKS IN THE COURSE ALREADY PASSED

Candidates desirous to improve the marks secured in a passed course 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.

15. AWARD OF LETTER GRADES

All assessments of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying 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
0	91 - 100	10	OUTSTANDING
A+	81-90	9	EXCELLENT
А	71-80	8	VERY GOOD
B+	66-70	7	GOOD
В	61 – 65	6	ABOVE AVERAGE
С	55 - 60	5	AVERAGE
D	50 - 54	4	PASS
RA	<50	-	REAPPEARANCE
AAA	-	-	ABSENT

16. 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 first semester onwards.

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

GPA of a Semester	Sum of the product of the GP by the corresponding credits of the courses offered in that Semester	
	Sum of the credits of the courses – of that Semester	
	of that Semester	10 0

$$= \frac{\sum_{n}\sum_{i}CniGPni}{\sum_{n}\sum_{i}Cni}$$

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: RA grade will be excluded for calculating GPA and CGPA.

17. REVALUATION

Candidate can apply for revaluation or retotalling 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 Examinations will arrange for the revaluation and results will be intimated to the candidate through the HODs concerned. Revaluation is not permitted for supplementary theory courses.

18. TRANSPARENCY AND GRIEVANCE COMMITTEE

Revaluation and Re-totaling is allowed on representation (clause 17). Student may get the Xerox copy of the answer script on payment of prescribed fee, if he / she wish. 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), the HoD of 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.

19. 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 pending against him / her.
- The award of the degree must be approved by the Board of Management.

20. CLASSIFICATION OF THE DEGREE AWARDED

- 20.1 Candidate who qualifies for the award of the Degree (vide clause 13) 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.
- 20.2 Candidate who qualifies for the award of the Degree (vide clause 13) 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.
- 20.3 All other candidates (not covered in clauses 20.1 and 20.2) who qualify for the award of the degree (vide Clause 19) shall be declared to have passed the examination in **Second Class**.

21. PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

- 21.1 A candidate due to valid reason on prior application may 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.
- 21.2 Such withdrawal shall be permitted only once during the entire period of study of the degree programme.
- 21.3 Withdrawal of application is valid only if it is made within 10 days prior to the commencement of the examination in that course or courses and

recommended by the HoD / Dean concerned and approved by the Registrar.

- 21.3.1 Notwithstanding the requirement of mandatory TEN days notice, applications for withdrawal for special cases under extraordinary conditions will be considered on the merit of the case.
- 21.4 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.
- 21.5 Withdrawal from the End semester examination is **NOT** applicable to arrears courses of previous semesters.
- 21.6 The candidate shall reappear for the withdrawn courses during the examination conducted in the subsequent semester.

22. PROVISION FOR AUTHORISED BREAK OF STUDY

- 22.1 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.
- 22.2 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.
- 22.3 The authorized 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 20). However, additional break of study granted will be counted for the purpose of classification.
- 22.4 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 22.3) in order that he/she may be eligible for the award of the degree.

22.5 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 21 and 22) is not applicable for this case.

23. 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 to the programme 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.

24. 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 prescribed fee to the Controller of Examinations within the stipulated time.

25. DISCIPLINE

- 25.1. If a student indulges in malpractice in any of the Internal / External Examinations he / she shall be liable for punitive action as prescribed by the KAHE from time to time.
- 25.2. Every student is required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the KAHE. 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.

26. 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.

Karpagam Innovation and Incubation Council (KIIC)

(A Section 8 Company)

Based on the 2019 National Innovation and Startup Policy and the 2019–2023 Tamil Nadu Startup Policy, KIIC has recommended to the KAHE students who are affiliated with the KIIC that it be incorporated in the university Program Regulations 2023-24 and implement from this academic year.

Norms to Student Start-Ups

- a) Any (UG/PG /(Ph.D.) Research scholars, student, right from the first year of their program is allowed to set a startup (or) work part time/ full time in a startup or work as intern in a startup
- b) Any (UG/PG / (Ph.D.) Research scholars) student right from the first year of their program is allowed to earn credit for working on Innovative prototypes/business Models/ Pre incubation (case to case basis).
- c) Start Up activities will be evaluated based on the guidelines being given by the expert committee of the KIIC
- d) Student Entrepreneurs may use the address of incubation center (KIIC) to register their venture while studying in KAHE.
- e) Students engaged in startups affiliated with the KIIC or those who work for them may be exempted from KAHE's attendance requirements for academic courses under current regulations, up to a maximum of 30% attendance per semester, including claims for ODs and medical emergencies Potential Students who have been incubated at KIIC may be permitted to take their University semester exams even if their attendance is below the minimum acceptable percentage, with the proper authorization from the head of the institution. (On case-to-case basis depends upon the applicability strength, societal benefits and quality of the Innovation and Subsequent engagement of the students with the/ her business)
- f) Any Students Innovators/entrepreneurs are allowed to opt their startup in place mini project /major project, /seminar and summer training etc. (In plant training, Internship, value added Course.). The area in which the student wishes to launch a Startup may be interdisciplinary or multidisciplinary.
- g) Student's startups are to be evaluated by Expert committee, formed by KIIC and KAHE

Guide lines to award Credits/ Marks to a Student startup

Student's startup stages are divided into five phases and these startup phases can be considered equally in place of the course title as mentioned below with the same credits allotted to the course title in a University curriculum.

Sl. No.	Description/Startup phases	In place of the Subject / Course title	Grades/Credits /Marks
1	Idea stage/Problem Identification	Seminar	
2	Proof of Concept (POC) /Solution development	In-plant training /Internship	Same Marks/Credits can
3	Product Development (Lab scale) /Prototype Model/ Company Registered	Mini Project/ Value added Course	be awarded that are listed in the course title's curriculum for the
4	Validation/Testing	Main Project phase I	respective startup phases.
5	Business Model/Ready for Commercialization/Implementation	Main Project phase II,	

Karpagam Innovation and Incubation Council (KIIC)

(A Section 8 Company)

Based on the 2019 National Innovation and Startup Policy and the 2019–2023 Tamil Nadu Startup Policy, KIIC has recommended to the KAHE students who are affiliated with the KIIC that it be incorporated in the university Program Regulations 2023-24 and implement from this academic year.

Norms to Student Start-Ups

- a) Any (UG/PG /(Ph.D.) Research scholars, student, right from the first year of their program is allowed to set a startup (or) work part time/ full time in a startup or work as intern in a startup
- b) Any (UG/PG / (Ph.D.) Research scholars) student right from the first year of their program is allowed to earn credit for working on Innovative prototypes/business Models/ Pre incubation (case to case basis).
- c) Start Up activities will be evaluated based on the guidelines being given by the expert committee of the KIIC
- d) Student Entrepreneurs may use the address of incubation center (KIIC) to register their venture while studying in KAHE.
- e) Students engaged in startups affiliated with the KIIC or those who work for them may be exempted from KAHE's attendance requirements for academic courses under current regulations, up to a maximum of 30% attendance per semester, including claims for ODs and medical emergencies Potential Students who have been incubated at KIIC may be permitted to take their University semester exams even if their attendance is below the minimum acceptable percentage, with the proper authorization from the head of the institution. (On case-to-case basis depends upon the applicability strength, societal benefits and quality of the Innovation and Subsequent engagement of the students with the/ her business)
- f) Any Students Innovators/entrepreneurs are allowed to opt their startup in place mini project /major project, /seminar and summer training etc. (In plant training, Internship, value added Course.). The area in which the student wishes to launch a Startup may be interdisciplinary or multidisciplinary.
- g) Student's startups are to be evaluated by Expert committee, formed by KIIC and KAHE

Guide lines to award Credits/ Marks to a Student startup

Student's startup stages are divided into five phases and these startup phases can be considered equally in place of the course title as mentioned below with the same credits allotted to the course title in a University curriculum.

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1	Idea stage/Problem Identification	Seminar	
2	Proof of Concept (POC) /Solution development	In-plant training /Internship	Same Marks/Credits can
3	Product Development (Lab scale) /Prototype Model/ Company Registered	Mini Project/ Value added Course	be awarded that are listed in the course title's curriculum for the
4	Validation/Testing	Main Project phase I	respective startup phases.
5	Business Model/Ready for Commercialization/Implementation	Main Project phase II,	

PROGRAM OUTCOMES:

Post Graduate student of Computer Science programme will be able to

- a. Apply basic concepts of Computer Science to effectively involve in the research.
- b. Design software to meet required needs with realistic constraints such as economical, environmental, social, ethical and sustainable in the field of Computer Science.
- c. Design and conduct experiments as well as to analyze, interpret data on experiments relevant to Computer Science practice.
- d. implement software designs to provide working solutions, including use of appropriate programming languages, web-based systems and tools, design methodologies, and database systems
- e. To attain in depth knowledge and understanding the principles of programming for applying in broad range of languages and open source platforms.
- f. Use IT skills and display mature computer literacy
- g. Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to computer science practice.
- h. Communicate effectively on complex research issues with research community and society, such as, being able to comprehend, write effective reports, design documentation and make effective presentations with clear instructions.
- i. Demonstrate knowledge and understanding of the computer science and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- j. Recognize the need for ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- k. Exhibit an outstanding association and active contribution in their professional including entrepreneurship using the information in Computer Science.
- 1. Contribute effectively as a team member/leader using common tools and adopt latest technologies in education and solve real world problems.
- m. Pursue life-long learning and research in specific fields of Computer Science and develop novel and research oriented methodologies in an effective manner.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO I: Understand analyze and develop computer programs in the areas related to Database systems and Big data Analytics, cloud computing, soft computing, IoT, Image processing, Green computing, web designing, mobile computing and networking for efficient design of computer based system of varying complexity.

PEO II: Apply standard software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality for business success.

PEO III: Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

POs	a	b	c	d	e	f	g	h	i	j	k	1	m
PEO1	Х		Х	X	Х	X			X	X		X	X
PEO2	Х	X	Х	X	Х	X	X	X			X	X	
PEO3	X		X	X	X	X			X	X	X		X

MAPPING of PEOs and POs

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

DEPARTMENT OF COMPUTER SCIENCE FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT PG PROGRAM (CBCS) – M.Sc. Computer Science (2023–2024 Batch and onwards)

Course Code	Nome of the Course	Objectiv es and out comes		Instructions hours / week			lit(s)	Maximum Marks			o No
Course Coue	Name of the Course	PEOs	POs	L	Т	Р	Cred	CIA	ESE	Total	Pag
					*			40	60	100	
		SE	EMES	TER	-1			10		100	
23CSP101	Python Programming	I	c,d	4	-	-	4	40	60	100	1
23CSP102	Big Data Analytics	Ι	a,g	4	-	-	4	40	60	100	4
23CSP103	Cryptography and Network Security	Ι	b,c	4	-	-	4	40	60	100	6
23CSP104	Cloud Computing	III	b,g	4	-	-	4	40	60	100	8
23CSP105	Elective – I *		2	4	-	-	4	40	60	100	10
23CSP111	Python Programming - Practical	Ι	c,d	-	-	4	2	40	60	100	18
23CSP112	Big Data Analytics - Practical	Ι	b,c	-	-	4	2	40	60	100	20
Journal Paper	Analysis & Presentation	III	h	2	I	I	-	-	-	-	
	Semester Total	-	-	22	I	8	24	280	420	700	
23CSP201	J2EE	Ι	с	4	-	-	4	40	60	100	27
23CSP202	Cyber Security	Ι	b,g	4	-	-	4	40	60	100	24
23CSP203	MongoDB	II	d	4	-	-	4	40	60	100	27
23CSP204	Internet of Things	Ι	b	4	-	-	4	40	60	100	29
23CSP205	Elective – II *			4	-	-	4	40	60	100	31
23CSP211	J2EE - Practical	Ι	с	-	-	4	2	40	60	100	37
23CSP212	MongoDB – Practical	II	d	-	-	4	2	40	60	100	39
Journal Paper	Analysis & Presentation	III	h	2	-	-	-	-	-	-	
	Semester Total	-	-	22	-	8	24	280	420	700	

	SEMESTER – III										
23CSP301	Angular JS	Ι	c,d	4	-	-	4	40	60	100	42
23CSP302	Software Testing and Quality Assurance	I,II	d,g	4	-	-	4	40	60	100	44
23CSP303	Digital Image Processing	Ι	с	4	-	-	4	40	60	100	46
23CSP304	Internetworking with TCP/IP	I,II I	d	4	-	-	4	40	60	100	48
23CPP305	Elective – III *			4	-	-	4	40	60	100	50
23CSP311	Angular JS - Practical	Ι	c,d	-	I	3	2	40	60	100	56
23CSP312	Software Testing and Quality Assurance - Practical	Ι	d,g	-	-	3	2	40	60	100	58
23XXPOE301	Open Elective *			3	I	-	2	40	60	100	60
23CSP391	Internship *	III	g,j	-	I	-	2	100	-	100	84
Journal Paper	Analysis & Presentation	III	h	1	I	-	I	-	-	-	
	Semester Total	-	-	24	-	6	27	420	480	900	
		SE	MEST	rer –	IV						
23CSP491	Project and Viva Voce	III	i,j	-	-	-	15	80	120	200	85
*End of II Sem	*End of II Semester Internship for 15 days										
	Semester Total 15 80 120 200										
	Program Total	-	-	68	-	22	90	1060	1440	2500	

ELECTIVE COURSES

	Course Code	Name of the Course
	23CSP105A	Mobile Computing
ELECTIVE – I	23CSP105B	Wireless Application Protocol
	23CSP105C	Wireless Sensor Networks
	23CSP205A	Artificial Intelligence
ELECTIVE – II	23CSP205B	Machine Learning
	23CSP205C	Deep Learning
	23CSP305A	Augmented Reality
ELECTIVE – III	23CSP305B	Introduction to Robotics
	23CSP305C	Intelligent Agents

LIST OF OPEN ELECTIVE COURSES

S. No.	Name of the Offering Department	Course Code	Course Name
1	Management	23MBAPOE301	Organisational Behaviour
2	Physics	23PHPOE301	Material Characterization
3	Physics	23PHPOE302	Numerical Methods and Programming
4	Computer Applications	23CAPOE301	Robotics Process Automation
5	Biochemistry	23BCPOE301	Nutrition and Dietetics
6	Computer Science	23CSPOE301	Cyber Forensics
7	Commerce	23CMPOE301	Personal Finance and Planning
8	Chemistry	23CHEOE301	Chemistry in Everyday Life
9	Microbiology	23MBPOE301	Fermentation Technology
10	English	23EGPOE301	English for Competitive Examinations
11	Biotechnology	23BTPOE301	Sericulture
12	M.Sc Mathematics	23MMPOE301	Coding Theory

4H - 4C

SEMESTER – I PYTHON PROGRAMMING (THEORY)

Instruction Hours/week: L: 4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- To create the basic python programming using expressions and operators
- To understand the fundamental principles of Object-Oriented Programming, as well as 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

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Apply modules for reusability and the object-oriented	Apply
	principles for modeling.	
CO2	Explore and solve real-world software development challenges	Explore
CO3	Analyze the concept of string and text files using python	Analyze
	programming.	
CO4	Construct applications with graphical user interface.	Construct
CO5	Develop software solutions using multi-threading, networking	Develop
	concepts.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	Μ	S	Μ	Μ	L	Μ	L	L	S	Μ	L
CO2	Μ	S	Μ	Μ	Μ	Μ	L	L	Μ	Μ	Μ	Μ
CO3	L	S	S	Μ	Μ	L	Μ	Μ	Μ	Μ	Μ	L
CO4	Μ	Μ	Μ	S	S	S	L	Μ	Μ	S	S	S
CO5	L	S	L	S	Μ	Μ	Μ	Μ	L	L	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I – Python Overview, Data Types, Expressions

(9 HOURS)

(9 HOURS)

Python programming – variable, Datatype, Keywords, Literals, Operator, Expression, type conversion, Comments, input and output, Strings, Assignment and Comments – Numeric Data Types and Character Sets, Expressions.

UNIT II – Functions, Modules and Control Statements

Functions and Modules-Calling Functions, the math Module, The Main Module, Program Format and Structure and Running a Script from a Terminal Command Prompt – Iteration – for loop – Selection – Boolean Type, Comparisons, and Boolean Expressions, if-else Statements,

One-Way Selection Statements, Multi-way if Statements, Logical Operators and Compound Boolean Expressions, Short- Circuit Evaluation and Testing Selection Statements - Conditional Iteration – while loop

UNIT III – Strings and Text Files

Strings-Accessing Characters and Substrings in Strings – Data Encryption – Strings and Number Systems and String Methods-Text Files-Text Files and Format – Writing Text to a File – Writing Numbers to a File – Reading Text from a File – Reading Numbers from a File and Accessing and Manipulating Files and Directories on Disk.

UNIT IV – Lists and Dictionaries

(10 HOURS) Lists-List Literals and Basic Operators, Replacing an Element in a List, List Methods for Inserting and Removing Elements, Searching and Sorting a List, Mutator Methods and the Value None, Aliasing and Side Effects, Equality and Tuples – Defining Simple Functions – Syntax, Parameters and Arguments, return Statement, Boolean Functions and main function, Dictionaries-Dictionary Literals - Adding Keys and Replacing Values - Accessing Values, Removing Keys and Traversing a Dictionary.

UNIT V – Design with Functions and Classes, Graphical User Interface (10 HOURS) Object Oriented Programming in Python: Classes, 'self-variable' Methods, Constructor Method. Inheritance. Overriding Methods. and Data hiding. Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules- Connecting to a database, Creating Tables.

Case Study: GUI based ATM.

SUGGESTED READINGS

- 1. Kenneth A. Lambert, Martin Osborne, "Fundamentals of Python: First Programs, Cengage Learning", second edition, 2018, ISBN13:978-1337560092.
- 2. Paul Barry, "Head First Python 2e", O'Reilly, 2nd Revised edition, 2016, ISBN-13: 978-1491919538.
- 3. Michal Jaworski, TarekZiade, "Expert Python Programming", Packt Publishing, Second Revised edition, 2016, ISBN-13: 978-1785886850.
- 4. Sam Washington, Dr. M. O. FaruqueSarker, "Learning Python Network Programming", Packt Publishing Limited, 2015, ISBN-13:978-1784396008.
- 5. Rick van Hattem, "Mastering Python", Packt Publishing, Second Edition, 2016, ISBN 139781786463746.

WEBSITES

- www.python.org/about/gettingstarted/ 1.
- 2. www.tutorialspoint.com/python/index.htm
- 3. www.realpython.com/python-beginner-tips/
- 4. https://nptel.ac.in/courses/106/106/106106182/
- https://nptel.ac.in/courses/106106145/ 5.

(10 HOURS)

2

JOURNALS

- 1. Kalyani Adawadkar," **Python Programming-Applications and Future** ", International Journal of Advance Engineering and Research Development, Special Issue SIEICON-2017, April -2017.
- K. R. Srinath, "Python The Fastest Growing Programming Language", International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 12, Dec-2017

SEMESTER – I BIG DATA ANALYTICS (THEORY)

Instruction Hours/week: L: 4 T: 0 P: 0

4H – 4C

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- To provides grounding in basic and advanced methods to big data technology and tools like MapReduce and Hadoop and its ecosystem.
- To Understand the Big Data Platform and web analytics
- To Provide an overview of Apache Hadoop and Design of HDFS
- To Understand Map Reduce features
- To Provide hands on Hbase, Pig and HiveQL queries and to introduce NoSQL and Data Model

Course Outcomes

Cos	Course Outcomes	Blooms Level
CO1	Apply Hadoop ecosystem components.	Apply
CO2	Access and Process Data on Hbase, Pig and HiveQL queries	Access
CO3	Manage Job Execution in Hadoop Environment	Manage
CO4	Analyze Map Reduce Types	Analyze
CO5	Apply Data Model and Connect your data and Dashboard	Apply

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	S	S	L	Μ	Μ	S	L	Μ	Μ	L
CO2	S	S	L	Μ	Μ	L	S	S	Μ	L	Μ	Μ
CO3	S	Μ	L	S	L	L	Μ	Μ	Μ	Μ	Μ	L
CO4	Μ	Μ	S	Μ	L	Μ	Μ	S	S	S	S	S
CO5	Μ	Μ	S	L	Μ	L	Μ	Μ	L	Μ	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I – Introduction to Big Data

What is big data – why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies - open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics

UNIT II – History of Hadoop

Understanding Hadoop Ecosystem -The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS- How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures- - Map Reduce Types and Formats- Map Reduce Features

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(10 HOURS)

UNIT III – Hbase

Data model and implementations – Hbase clients – Hbase examples – praxis. Cassandra – cassandra data model – cassandra examples – cassandra clients – Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts.

UNIT IV–Big Data Analytics

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

UNIT V-Introduction to NOSQL

Aggregate data models – aggregates – key-value and document data models – relationships– schemaless databases – materialized views – distribution models -peer-peer replication – consistency – relaxing consistency – version stamps – partitioning and combining – composing map-reduce calculations -Document based Database – CAP theorem - MongoDB- Introduction-Data Model- Working with data- Replication & Sharding- Development

SUGGESTED READINGS

- Daniel G.Murray. (2018). Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software. 2nd Edition. Wiley.
- 2. Joshua N. Milligan. (2016). Learning Tableau. Packt Publishing Ltd. UK
- 3. Tom White. (2015). The Definitive Guide to Mongodb. 4th Edition. OReilly.
- 4. Rik Van Bruggen. (2015). Learning Neo4j. 1st Edition. Packt Publishing Ltd. UK.
- 5. GauravVaish. (2015). Getting Started with NoSQL. Packt Publishing Ltd. UK.
- 6. Pramod J. Sadalage, Martin Fowler. (2015). NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Pearson Education.
- 7. Tom White. (2015). Hadoop: The Definitive Guide. 2nd Edition. OReilly.
- 8. Dirk deRoos, Paul Zikopoulos, Bruce Brown, Roman B. Melnyk, RafaelCoss. (2015). Hadoop For Dummies.

WEBSITES

- 1. https://www.tutorialspoint.com/big_data_analytics/
- 2. hadoop.apache.org/
- 3. https://www.mongodb.com/nosql-explained
- 4. https://neo4j.com/
- 5. https://nptel.ac.in/courses/106104189/

JOURNALS

1. Reihaneh H. Hariri, Erik M. Fredericks & Kate M. Bowers," Uncertainty in big data analytics: survey, opportunities, and challenges", Journal of Big Data volume 6, Article number: 44 (2019)

(10 HOURS)

(8 HOURS)

SEMESTER – I CRYPTOGRAPHY AND NETWORK SECURITY (THEORY)

Instruction Hours/week: L: 4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- This course will provide students with a theoretical knowledge to understand the fundamental principles of access control models and techniques and,
- To understand theory of fundamental cryptography, encryption and decryption algorithms
- To know about various encryption techniques.
- To understand various Block Ciphers, DES and AES algorithms
- To understand the concept of public key cryptography.
- To study about message authentication, hash functions, web security, electronic mail security, firewalls

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Classify the symmetric encryption techniques	Classify
CO2	Illustrate various public key cryptographic techniques	Illustrate
CO3	Evaluate the authentication and hash algorithms.	Evaluate
CO4	Summarize the intrusion detection and its solutions to overcome	Summarize
	the attacks.	
CO5	Understand basic concepts of system level security and to	Understand
	develop secure authentication systems.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	L	L	Μ	L	L	Μ	L	Μ	Μ	L
CO2	Μ	S	S	S	Μ	S	Μ	Μ	Μ	L	Μ	Μ
CO3	S	L	S	Μ	Μ	S	Μ	L	L	S	Μ	L
CO4	L	S	S	Μ	L	L	S	S	S	Μ	S	S
CO5	Μ	S	L	Μ	S	L	Μ	S	Μ	L	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I – Introduction

Security Trends - The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security. Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques - Transposition Techniques – Rotor Machines - Steganography.

UNIT II – Block Ciphers and Data Encryption Standard

Block Cipher Principles – The Data Encryption Standard - The Strength of DES –Advanced Encryption Standard (AES) – Evaluation Criteria for AES – The AES Cipher – Multiple

4H - 4C

(9 HOURS)

(10 HOURS)

6

Encryption and Triple DES - Block Cipher Modes of Operation - Stream Ciphers and RC4modular Arithmetic and Euclidean Algorithm.

UNIT III – Confidentiality Using Symmetric Encryption (10 HOURS)

Placement of Encryption Function - Traffic Confidentiality - Key Distribution - Public key Cryptography and RSA – Principles of Public Key Cryptosystems – The RSA Algorithm- Basic prime numbers and Discrete Logarithms -Key Management – Diffie Hellman Key Exchange.

UNIT IV – Message Authentication and Hash Functions

Authentication Functions - Message Authentication Codes (MAC's) Functions - Security of Hash Functions and MAC's Digital Signatures and Authentication Protocols – Digital Signatures - Digital Signature Standard

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 ZeroKnowledgeProof.

SUGGESTED READINGS

- 1. Atul Kahate. (2019). Cryptography and Network Security. 4th Edition. Tata McGraw Hill. New Delhi.
- 2. Charlie Kaufman, Radia Perlman, & Mike Speciner. (2017). Network Security Private Communication in a Public World. 2nd Edition. Prentice-Hall of India. New Delhi.
- 3. William Stallings. (2017). Cryptography and Network Security Principles and Practices. 6th Edition. Pearson Education. New Delhi.
- 4. John F. Dooley. (2016). History of Cryptography and Cryptanalysis: Codes, Ciphers, and Their Algorithms. Springer.

WEBSITES

- 1. williamstallings.com/Crypto3e.html
- 2. u.cs.biu.ac.il/~herzbea/book.html
- 3. cryptofundamentals.com/algorithms
- 4. https://www.tutorialspoint.com/cryptography/index.htm
- 5. https://nptel.ac.in/courses/106105162/

JOURNALS

1. Yahia Alemami, Mohamad Afendee Mohamed, Saleh Atiewi, Research on Various Cryptography Techniques, International Journal of Recent Technology and Engineering (IJRTE), Volume-8, Issue-2S3, July 2019.

(9 HOURS)

SEMESTER – I CLOUD COMPUTING (THEORY)

Instruction Hours/week: L:4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- To Provide a good understanding of the concepts, standards in Cloud computing
- To make the student understand about the cloud service providers and their usage.
- To learn how to secure the data in cloud depending.
- To understand the various service level agreements.
- To understand the cloud using various case studies.

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Illustrate the recent trends in the field of cloud computing and	Illustrate
	providing exposures to some open source and commercial	
	clouds.	
CO2	Identify the architecture of the cloud and the usage of clouds.	Identify
CO3	Recognize the secure data from the security issues.	Recognize
CO4	Develop the students to work based on the various service level	Develop
	agreements.	
CO5	Apply the traditional cloud and Microsoft azure, etc.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	Μ	L	S	L	S	Μ	S	Μ	S	Μ	L
CO2	S	L	Μ	Μ	S	Μ	L	S	S	Μ	Μ	Μ
CO3	S	Н	Μ	S	Μ	Μ	S	L	S	Μ	Μ	L
CO4	Μ	Μ	S	Μ	S	Μ	S	Μ	S	L	S	S
CO5	L	Μ	L	L	Η	L	Μ	S	Μ	L	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I – Introduction to Cloud Computing

Characteristics of Cloud Computing -Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards-Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud -Community cloud

UNIT II – Service Models

Infrastructure as a Service (IaaS) -Platform as a Service (PaaS) -Software as a Service (SaaS) - Identity as a Service (IdaaS) -Compliance as a Service (CaaS)- Cloud storage- Advantages of Cloud Storage – Cloud Storage Providers.

4H - 4C

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UNIT III – Virtualization Technologies

Load Balancing and Virtualization -Advanced load balancing -The Google cloud - Hypervisors -Virtual machine types -VMware vSphere - Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance. Virtualization of CPU –Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT IV – Cloud Information Security Objectives

Confidentiality Integrity and Availability -Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing Risk Issues -The CIA Triad Privacy and Compliance Risks -Threats to Infrastructure Data and Access Control -Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider Risks Architectural Considerations General Issues-Trusted Cloud Computing -Identity Management and Access Control

UNIT V – Datacenter

Datacenter: Data center overview -Components - Provisions - Need of Data Center - Data Center Architecture - Different Racks - Data center architecture for cloud computing - role of data center in cloud computing.

Case Studies

Case Study on Open Source and Commercial Clouds: Microsoft Azure- Amazon EC2-Google Web services – Open Nebula.

SUGGESTED READINGS

- 1. Dr Kumar Saurabh.(2018). Cloud Computing .2ndediton. New Delhi: Wiley India.
- 2. Nikos Antonopoulos, Lee Gillam. (2018). Cloud Computing: Principles Systems and Applications . Springer.
- 3. <u>Giovanni Toraldo</u>. (2017). Open Nebula 3 Cloud Computing.
- 4. Barrie Sosinsky .(2017). Cloud Computing Bible .Wiley- India. New Delhi
- 5. Rajkumar Buyya, James Broberg, & Andrzej, M. Goscinski. (2017). New Delhi: Tata Mc-Graw Hill.
- 6. Ronald, L. Krutz, Russell Dean Vines. (2016). Cloud Security: A Comprehensive Guide to Secure Cloud Computing. New Delhi: Wiley –India
- 7. Anthony T.Velte Toby J.Velte Robert Elsenpeter. (2016). Cloud Computing Practical Approach (1st ed.). New Delhi:Tata McGraw Hill.

WEBSITES

- 1. en.wikipedia.org/wiki/Cloud_computing
- 2. www.ibm.com/cloud-computing/in/en/
- 3. <u>www.oracle.com/CloudComputing</u>
- 4. www.microsoft.com/en-us/cloud/default.aspx
- 5. https://nptel.ac.in/courses/106105167/

JOURNALS

 K.Naresh, P.Leela, P.Suneetha, Purandhar.N," Research on Cloud Computing By using SaaS Model ",International Journal of Recent Technology and Engineering (IJRTE), Volume-8, Issue-1S4, June 2019

(10 HOURS)

(8 HOURS)

SEMESTER – I MOBILE COMPUTING (THEORY)

Instruction Hours/week: L: 4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- 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,3Gand 4G

Course Outcomes

COs	Course Outcomes	Blooms
		Level
CO1	Analyze the architecture, merits and demerits of Wireless technologies like	Extract
	Infra-Red Bluetooth, Wi-Fi, RFID and Wi-Max	
CO2	Characterize the principles of mobile technologies like GPRS, GSM, CDMA,	Understand
	and TDMA	
CO3	Compare the characteristics and techniques MANET with VANET	Identify
CO4	Analyzete chnology of 1G, 2G, 3G and 4G for gaining the working knowledge of for the standard standa	Apply
	urgenerationwireless technologies.	
CO5	Apply the features of Android programming for developing Android	Develop
	Applications	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	S	L	Μ	Μ	Μ	L	S	S	Μ	L
CO2	Μ	Μ	L	L	S	L	S	S	S	Μ	Μ	Μ
CO3	S	Μ	S	L	Μ	Μ	Μ	L	S	S	Μ	L
CO4	Μ	Μ	L	L	S	L	S	S	S	Μ	S	S
CO5	S	Μ	L	Μ	Н	Μ	L	Μ	L	S	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I – Introduction

Mobile Computing- Middleware and Gateways-Developing Mobile Computing Applications-Mobile Computing Vs Wireless Networking - Characteristics of Mobile computing -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

4H - 4C

10
UNIT II – Bluetooth and GSM

Bluetooth- Features and working of RFID -Wireless Broadband (WiMax)- Mobile IP – IPV6-IPV4 Vs IPV6 –Global System for MobileCommunications–GSM Architecture–CallRouting inGSM – GSM Addressesand Identifiers–NetworkAspectsinGSM–GSMFrequencyAllocation– Authenticationand Security- Mobile Computing Over SMS – SMS-ValueAdded 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 SpectrumTechnology-CDMAVersusGSM—Featuresof3GNetworks–Architectureof3G-Applications of 3G - Features of 4G- Architecture of 4G - Wireless Technologies Used in 4G-Meritsand Demerits of 4G- 5G Architecture-Features of 5G.

UNIT IV – Mobile Ad-Hoc Networks

MOBILE Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – **Types of MANETS-** Routing - **Classification of Routing**–Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular AdHoc Networks (VANET) – MANETVs VANET – Security of VANET and MANET.

UNIT V – Android Operating System

History of Android – Introduction to Android Operating Systems – Android Architecture -Android UI Layouts – Android UI Controls – Android Event Handling - 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 life cycle, User Interface, Design of Android – Features of Android SQLite Database – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone.

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. SunilkumarS.Manvi,MahabaleshwarS.Kakkasageri,2016. "Wireless and Mobile Networks, Concepts and Protocols", Wiley Publications.
- 4. Stefano Basagni, Marco Conti ,Silvia Giordano, Ivan Ivan Stojmenovic,2015. "Mobile Ad Hoc Networking, The Cutting-Edge Directions", Wiley Publications.
- 5. James C. Sheusi, 2013. "Android application development for Java programmers, Cengage Learning".
- 6. CharlesE.Perkins,2008. "AdHoc 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

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

(10 HOURS)

(10 HOURS)

(8 HOURS)

(10 HOURS)

NPTEL

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

LMS

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

4H - 4C

SEMESTER – I WIRELESS APPLICATION PROTOCOL (THEORY)

Instruction Hours/week: L: 4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- To learn the concept of Wireless Application Protocols.
- To learn Development tools, Language and built Wireless Application
- To learn wireless concepts, Technologies and gateways.
- To know the components of WAP, WTA Architecture and its security.
- To learn the different application area of WAP.

Course Outcomes (COs)

COs	Course Outcomes	Blooms Level
CO1	Pursue research in the area of wireless communication.	Extract
CO2	Develop applications that are mobile-device specific and demonstrate current practice in mobile communication contexts.	Understand
CO3	Understand Components of the WAP Standards and Wireless Telephony Applications	Identify
CO4	Understand components and various protocols.	Apply
CO5	Know about WTA Architecture and its security	Develop

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	L	L	Μ	L	L	Μ	L	Μ	Μ	L
CO2	Μ	S	S	S	Μ	S	Μ	Μ	Μ	L	Μ	Μ
CO3	S	L	S	Μ	Μ	S	Μ	L	L	S	Μ	L
CO4	L	S	S	Μ	L	L	S	S	S	Μ	S	S
CO5	Μ	S	L	Μ	S	L	Μ	S	Μ	L	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I – Mobile Data Introduction

The Rise of Mobile Data-Key Services for the Mobile Internet- Overview of the WAP-The origins of the WAP- WAP architecture-WAP Internal Structure-Components of the WAP Standards-WAP Gateways-Network Infrastructure Services Supporting WAP Clients-WAP Architecture Design Principles –Working of Wireless Application Protocol or WAP Model -Relationship with other standards.

UNIT II – The Wireless Markup Language

Overview-The WML Document Model-WML Structure-WML Authoring-URLS Identity Content-Mark Up Basics- WML Basics-Basic Content-Events Tasks and Binding.

(10 HOURS)

(10 HOURS)

UNIT III – WML

Variables -Other Content you can include-Controls-Miscellaneous Markup- Sending Information-Application Security-Other Data; The Meta element- Document Type Declarations- Errors and browsers Limitations-Content generation- WML Version Negotiation.

UNIT IV – User Interface Design

Making Wireless Applications Easy to Use- Website Design- Computer Terminals Vs Mobile Terminals-Designing a usable WAP site-structured usability method-user interface design guidelines- Design guidelines for selected WML Elements. Database-Driven WAP: ASP and WAP, ActiveX Data Objects (ADO), methods of converting existing HTML web site to WAP, M-Commerce and Security, Push Technology and Telematics.

UNIT V – Wireless Telephony Applications

Overview of the WTA Architecture- WTA Client Frame Work –WTA Server and Security- Design Considerations- Application Creation Tool Box- Future of WTA Enhancements. The Mobile Internet Future: Better Content- Easier Access-Beyond Browsing – Beyond Cellular- Mobile Data Unleashed.

SUGGESTED READINGS

- 1. Ruseyev, S. (2018). WAP Technology & Applications. 1st edition. New Delhi: Eswar Publications.
- 2. Charles Arehart., & Nirmal Chidambaram et al. (2017). Professional WAP.New Delhi: Shroff Publishers & Distributers Pvt Ltd.
- 3. Dale Bul Brook. (2016). WAP A Beginner's Guide. 1st edition. New Delhi: TMH Publication
- 4. Sandeep Singhal. (2016). The Wireless Application Protocol. 1st edition. New Delhi: Pearson Education.

WEBSITES

- 1. www.en.wikipedia.org/wiki/Wireless_Application_Protocol
- 2. <u>www.wap.com</u>
- 3. <u>www.w3schools.com/wap/</u>
- 4. <u>https://www.tutorialspoint.com/wap/wap_introduction.htm</u>

JOURNAL

- 1. http://journal.library.iisc.ernet.in/index.php/iisc/article/view/511
- 2. <u>http://www.ijecs.in/index.php/ijecs/article/view/2819</u>
- 3. <u>http://www.ijtrd.com/papers/IJTRD1289.pdf</u>

(10 HOURS)

(10 HOURS)

4H - 4C

SEMESTER – I WIRELESS SENSOR NETWORKS (THEORY)

Instruction Hours/week: L: 4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- To understand the basics of Adhoc & Sensor Networks
- To learn various fundamental and emerging protocols of all layers in adhoc network
- To study about the issues per taining to major obstacles in establishment and efficient management of adhoc and sensor networks
- To understand the nature and applications of adhoc and sensor networks
- To understand various security practices and protocols of Adhoc and Sensor Networks

Course Outcomes (Cos)

Cos	Course Outcomes	Blooms Level
CO1	Create a Sensor network environment for different type of	Develop
	applications	
CO2	Design ad-hoc and sensor network architectures using QoS and	Understand
	Congestion control mechanisms	
CO3	Apply appropriate routing algorithms for different network	Apply
	environments	
CO4	Analyze the working of ad-hoc and sensor network for various	Apply
	applications	
CO5	Deploy security mechanisms in the wireless ad-hoc and sensor	Develop
	networks	

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	L	L	Μ	L	L	Μ	L	Μ	Μ	L
CO2	Μ	S	S	S	Μ	S	Μ	Μ	Μ	L	Μ	Μ
CO3	S	L	S	Μ	Μ	S	Μ	L	L	S	Μ	L
CO4	L	S	S	Μ	L	L	S	S	S	Μ	S	S
CO5	Μ	S	L	Μ	S	L	Μ	S	Μ	L	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I – AdHoc Networks Fundamentals & Communication Protocols (10 HOURS) Fundamentals and Elements of WLANs – IEEE 802.11 Architecture –Self Configuration and Auto configuration – issues in Ad-Hoc Wireless Networks – MAC Protocols for Ad-Hoc Wireless Networks – Contention Based Protocols – TCP Over AdHoc Networks – TCP Protocol Overview TCP and MANETs – Solutions for TCP Over AdHoc 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 – Challenges for Wireless Sensor Networks 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 (9 HOURS)

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 – Defence against Routing Attacks – Secure Adhoc Routing Protocols – Broad cast 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,
- 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 HOURS)

(10 HOURS)

(10 HOURS)

- 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..

WEBSITES

- 1. **www.winlab.rutgers.edu** >~crose>dimacs03>kumar
- 2. <u>https://link.springer.com/chapter/10.1007/978-3-642-37949-9_5</u>
- 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-emergingtechnologies-coursera

NPTEL

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

SEMESTER – I PYTHON PROGRAMMING – PRACTICAL

(PRACTICAL) Marks: Internal: 40 External: 60 Total: 100

4H - 2C

Instruction Hours/week: L: 0 T: 0 P: 4

End Semester Exam: 3 Hours

Course Objectives

- To Master the principles of object-oriented programming and the interplay of algorithms and data structures in well-written modular code;
- To Solve problems requiring the writing of well-documented programs in the Python • language, including use of the logical constructs of that language;
- To Understand the basic logic statements in Python
- To Handle Strings in Python.
- To Understand Lists, Dictionaries in Python.

Course Outcomes

Cos	Course Outcomes	Blooms Level
CO1	Master an understanding of scripting and the contributions of	Understanding
	scripting languages.	
CO2	Master an understanding of Python especially the object-	Understanding
	oriented concepts	
CO3	Master an understanding of the built-in objects of Python	Understanding
CO4	Identify compound data using Python lists, tuples, dictionaries.	Identify
CO5	Elaborate Read and write data from/to files in Python Programs.	Create

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	L	L	Μ	L	L	Μ	L	Μ	Μ	L
CO2	Μ	S	S	S	Μ	S	Μ	Μ	Μ	L	Μ	Μ
CO3	S	L	S	Μ	Μ	S	Μ	L	L	S	Μ	L
CO4	L	S	S	Μ	L	L	S	S	S	Μ	S	S
CO5	Μ	S	L	Μ	S	L	Μ	S	Μ	L	Μ	Μ

S-Strong; M-Medium; L-Low

List of Programs

- 1. Write a program to demonstrate different number data types in python
- 2. Write a program to perform different arithmetic operations on numbers in python.
- Write a program to create, concatenate and print a string and accessing substring from a 3. given string.
- Write a python program to create, append and remove lists in python. 4.
- Write a program to demonstrate working with tuples in python 5.
- Write a python program to define a module and import a specific function 6.
- 7. in that module to another program.
- 8. Write a program that inputs a text file. The program should print all of the

- 9. unique words in the file in alphabetical order.
- 10. Write a python program using Graphical User Interfaces
- 11. Write a python program using Exceptional Handling
- 12. Write a python program using Chat Applications

SUGGESTED READINGS

- 1. Kenneth A. Lambert, Martin Osborne, "Fundamentals of Python: First Programs, Cengage Learning", second edition, 2018, ISBN13:978-1337560092.
- Paul Barry, "Head First Python 2e", O'Reilly, 2nd Revised edition, 2016, ISBN-13: 978-1491919538.
- 3. Michal Jaworski, TarekZiade, "Expert Python Programming", Packt Publishing, Second Revised edition, 2016, ISBN-13: 978-1785886850.
- 4. Sam Washington, Dr. M. O. FaruqueSarker, "Learning Python Network Programming", Packt Publishing Limited, 2015, ISBN-13:978-1784396008.
- 5. Rick van Hattem, "Mastering Python", Packt Publishing, Second Edition, 2016, ISBN 139781786463746.

WEB LINKS

- 1. www.python.org/about/gettingstarted/
- 2. <u>www.tutorialspoint.com/python/index.htm</u>
- 3. <u>www.realpython.com/python-beginner-tips/</u>
- 4. <u>https://nptel.ac.in/courses/106/106/106106182/</u>
- 5. https://nptel.ac.in/courses/106106145

4H - 2C

SEMESTER – I BIG DATA ANALYTICS – PRACTICAL (PRACTICAL)

Instruction Hours/week: L: 0 T: 0 P: 4

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- To provide grounding in basic and advanced methods to big data technology and tools
- like MapReduce and Hadoop and its ecosystem.
- To understand the Big Data Platform and web analytics
- To provide an overview of Apache Hadoop and Design of HDFS
- To understand Map Reduce features
- To provide hands on Hbase, Pig and HiveQL queries

Course Outcomes

Cos	Course Outcomes	Blooms Level
CO1	Apply Hadoop ecosystem components.	Apply
CO2	Access and Process Data on Hbase, Pig and HiveQL queries	Analyze
CO3	Manage Job Execution in Hadoop Environment	Manage
CO4	Analyze Map Reduce Types	Analyze
CO5	Apply Data Model and Connect your data and Dashboard	Role – Play

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	L	L	Μ	L	L	Μ	L	Μ	Μ	L
CO2	Μ	S	S	S	Μ	S	Μ	Μ	Μ	L	Μ	Μ
CO3	S	L	S	Μ	Μ	S	Μ	L	L	S	Μ	L
CO4	L	S	S	Μ	L	L	S	S	S	Μ	S	S
CO5	Μ	S	L	Μ	S	L	Μ	S	Μ	L	Μ	Μ

S-Strong; M-Medium; L-Low

List of Programs

- 1. To write a program to demonstrate function and operators using R studio
- 2. Grouping value sin to vectors, then doing arithmetic and graphs with them
- 3. Creating and graphing two-dimensional data sets using R Programming
- 4. Calculating and plotting some basic statistics: mean, median and standard deviation
- 5. To create and plot the categorized data using factors using R Programming
- 6. Organizing values into data frames, loading frames from files and merging them
- 7. To write a program to design R as a calculator
- 8. To write a program to demonstrate Probability distributions
- 9. To write a program to demonstrate Importing and exporting data
- 10. To write a program to establish a Regression using R Programming

SUGGESTED READINGS

- Daniel G.Murray. (2018). Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software. 2nd Edition. Wiley.
- 2. Joshua N. Milligan. (2016). Learning Tableau. Packt Publishing Ltd. UK
- 3. Tom White. (2015). The Definitive Guide to Mongodb. 4th Edition. OReilly.
- 4. Rik Van Bruggen. (2015). Learning Neo4j. 1st Edition. Packt Publishing Ltd. UK.
- 5. GauravVaish. (2015). Getting Started with NoSQL. Packt Publishing Ltd. UK.
- 6. Pramod J. Sadalage, Martin Fowler. (2015). NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Pearson Education.
- 7. Tom White. (2015). Hadoop: The Definitive Guide. 2nd Edition. OReilly.
- 8. Dirk deRoos, Paul Zikopoulos, Bruce Brown, Roman B. Melnyk, RafaelCoss. (2015). Hadoop For Dummies.

WEBSITES

- 1. https://www.tutorialspoint.com/big_data_analytics/
- 2. hadoop.apache.org/
- 3. https://www.mongodb.com/nosql-explained
- 4. https://neo4j.com/
- 5. https://nptel.ac.in/courses/106104189/

4H-4C

SEMESTER - II J2EE (THEORY)

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

Course Objectives

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications

Course Outcomes (COs)

- Understand the In-depth concepts of JEE
- Understand the in-depth Life cycle of servlets and JSP.
- Learn how to communicate with databases using Java.
- Handle Errors and Exceptions in Web Applications
- Use NetBeans IDE for creating J2EE Applications

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	Μ	L	L	Μ	L	L	Μ	L	Μ	Μ	L
CO2	Μ	S	S	S	Μ	S	Μ	Μ	Μ	L	Μ	Μ
CO3	S	L	S	Μ	Μ	S	Μ	L	L	S	Μ	L
CO4	L	S	S	Μ	L	L	S	S	S	Μ	S	S
CO5	Μ	S	L	Μ	S	L	Μ	S	Μ	L	Μ	Μ

Mapping with Programme Outcomes

S-Strong; M-Medium; L-Low

Unit I - J2EE OVERVIEW

(8 HOURS)

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

Unit II - J2EE DATABASE CONCEPTS

Data – Database – Database Schema. Introduction- Jdbc Architecture- Types of Drivers. Statement- ResultSet- Read Only ResultSet – Updatable ResultSet--Forward Only ResultSet -Scrollable ResultSet – Prepared Statement—Metadata- Connection Modes-SavePoint- Batch Updations-Callable Statement- BLOB & CLOB.

Unit III - JAVA SERVLETS

Benefits – Anatomy – HTML Forms- HTTP: Request-response, headers, GET, POST -Servlet Lifecycle: init(), service(), destroy()- Requests and responses- Core Servlet API: Generic Servlet, Servlet Request, and Servlet Response-HTTP Servlets: Http Servlet Request, Http Servlet Response and Http Servlet- Accessing Parameters

Unit IV - ENTERPRISE JAVA BEANS

Entity Java Bean - Session Java Bean – Home and Remote Interfaces-Stateless bean- Stateful bean-EJB Exceptions- EJB deployment process Message Driven Bean.

Unit V – JSP

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. (2018). The Complete Reference J2EE 1stedtion New Delhi: Tata McGraw Hill.
- 2. Duane, K. Fields., & Mark, A. Kolb. (2017). Web Development with Java Server Pages (1st ed.). Pune: Manning Publications.
- Rod Johnson. (2017). J2EE Development without EJB 1st edition. New Delhi:Wiley Dream Tech.
- 4. Rod Johnson., & Rod Johnson, P.H. (2016). Expert One-On-One J2EE Design and Development. New Delhi: John Wiley & Sons.
- 5. Paul, J. Perrone., Venkata, S. R. Chaganti., Venkata S. R. Krishna., & Tom Schwenk. (2016). J2EE Developer's Handbook. New Delhi: Sams Publications.
- 6. Joseph, J. Bambara et al. (2016). J2EE Unleashed (1st ed.). New Delhi:Tech Media.

WEBSITES

- 1. https://www.oracle.com/technetwork/java/javaee/appmodel-135059.html
- 2. https://www.geeksforgeeks.org/introduction-java-servlets/
- 3. http://media.datadirect.com/download/docs/jdbc/alljdbc/jdbcconnect/j2ee.html
- 4. https://www.javatpoint.com/ejb-tutorial
- 5. https://www.javatpoint.com/jsp-tutorial
- 6. https://nptel.ac.in/courses/106105191/

(8 HOURS)

(8 HOURS)

23

SEMESTER-II CYBER SECURITY (THEORY)

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

- To state the basic concepts in information security, including security policies, security models, and security mechanisms.
- To provide an exposure to the spectrum of security activities methods methodologies and procedures with emphasis on practical aspects of Information Security.
- To understand principles of web security.
- To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
- To understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.

Course Outcomes

COs	Course Outcomes	Blooms
		Level
CO1	To gain knowledge the basic concepts in information security, including	Knowledge
	security policies, security models, and security mechanisms.	
CO2	Evaluate the concepts related to applied cryptography including the four	Evaluate
	techniques for crypto-analysis symmetric and asymmetric cryptography,	
	digital signature, message authentication code, hash functions and modes	
	of encryption operations.	
CO3	Evaluate common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.	Evaluate
CO4	To gain knowledge about securing both clean and corrupted systems	Knowledge
04	protect personal data, and secure computer networks.	Knowledge
CO5	To understand key terms and concepts in cyber law, intellectual property	Understand
	and cybercrimes, trademarks and domain theft.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	L	Μ	L	Μ	S	Μ	L
CO2	S	S	S	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ
CO3	L	S	Μ	Μ	S	Μ	L	L	S	L	Μ	L
CO4	S	S	Μ	L	L	S	S	S	Μ	S	S	S
CO5	S	L	Μ	S	L	Μ	S	Μ	L	Μ	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I - INTRODUCTION TO CYBERCRIME

Definition and Information Security-who are cybercriminals? - Classification of cybercrimes. Cybercrime: The legal perspectives- cybercrimes: An Indian Perspective - cybercrime and the Indian ITA2000: Hacking and the Indian law(s) - A Global Perspective on cybercrimes: cybercrime and the Extended Enterprise - cybercrime Era: Survival Mantra for the Netizens - Concluding Remarks and Way Forward to Further Chapters.

UNIT II - CYBER OFFENSES

How Criminals Plan Them: Introduction: categories of Cybercrime -How criminals Plan the Attacks: Reconnaissance Passive Attacks Active Attacks Scanning and Scrutinizing Gathered Information Attack(Gaining and Maintaining the system Access) -social Engineering: Classification of Social Engineering – Cyber talking: Types of stalkers Cases Reported on Cyber stalking How stalking Works? real-life incident of Cyber stalking -Cybercafe and Cybercrimes - Botnets: The Fuel for cybercrime: Botnet - Attack Vector-Cloud Computing: Why cloud computing? Types of Services Cybercrime and Cloud Computing.

UNIT III – CYBERCRIME

Mobile and wireless Devices-Introduction - Proliferation of Mobile and Wireless Devices - Trends in Mobility-Credit Card Frauds in Mobile and Wireless Computing Era: Types and Techniques of Credit Card Frauds - Security challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service security: cryptographic security LDAP Security RAS Security Media Player Control Security Networking API Security - Attacks on Mobile/Cell Phones: Mobile Phone Theft Mobile Viruses Mishing Vishing Smishing Hacking Bluetooth.

UNIT IV-MOBILE DEVICES

Security Implication for Organizations – Managing Diversity and Proliferation of Hand-Held Devices Unconventional/ Stealth Storage Devices Threats through Lost and Stolen Devices Protecting Data on lost devices Educating the Laptop Users - Organizational Measures for Handling Mobile devices - Related Security Issues: Encrypting Organization Databases Including Mobile Devices in Security Strategy -Organizational Security Policies and Measures in mobile Computing Era: Importance of Security polices relating to mobile Computing Devices Operating Guidelines for Implementing Mobile Devices Security Polices Organizational Policies for the Use of Mobile Hand - Held Devices - Laptops: Physical Security Countermeasures.

UNIT V - TOOLS AND METHODS USED IN CYBERCRIME

Introduction - Proxy Servers and Anonymizers - Phishing: How Phishing Works? - Password Cracking: Online Attacks Offline Attacks Strong Weak and Random Passwords Random passwords - Keyloggers and Spywares: Software Keyloggers Hardware Keyloggers Anti Keylogger Spywares - Virus and Worms: Types of Virus - Trojan Horses and Backdoors: backdoor How to protect from Trojan Horses and Backdoors - Steganography: Steganalysis - DoS and DDoS Attacks: DoS Attacks Classification of DoS Attacks Types or Levels of DoS Attacks Tools Used to Launch DoS Attacks DDoS Attacks How to Protect from DoS/DDoS Attacks – SQL Injection: Steps for SQL Injection Attacks How to Prevent SQL Injection Attacks - Buffer Overflow: Types of Buffer Overflow How to Minimize Buffer Overflow - Attacks on Wireless Networks: Traditional Techniques of Attacks on Wireless Networks Theft of Internet Hours and Wi-fi-based Frauds and Misuses How to Secure the Wireless Networks.

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

(8 HOURS)

(8 HOURS)

(8 HOURS)

SUGGESTED READINGS

- 1. Nina Godbole & SUNIT Belapure. (2013). CYBER SECURITY. Wiley India Pvt. Ltd. New Delhi
- Godbole, N. (2009). Information Systems Security: Metrics Frameworks and Best Practices. Wiley India. New Delhi
- 3. Marther, T., Kumaraswamy, S., & Latif, S. (2009). Cloud Security and Privacy: An Enterprise Perceptive on Risk and Complaince. O'Reilly.
- 4. Dieter Gollmann. (2006). Computer Security. 2nd edition. John Wiley & Sons
- 5. Charles ,P. Pfleeger ,& Shari, L. Pfleeger. (2003).

WEBSITES

- 1. http://www.csc.ncsu.edu/faculty/ning
- 2. csrc.nist.gov/publications/nistpubs/800-12/handbook.pdf
- 3. www2.warwick.ac.uk/fac/sci/dcs/teaching/modules/cs134/
- 4. http://nptel.ac.in/courses/106105031/40
- 5. http://nptel.ac.in/courses/106105031/39
- 6. http://nptel.ac.in/courses/106105031/38

JOURNALS

 Noura Al-Suwaidi , Haitham Nobanee , & Fauzia Jabeen, Estimating Causes of Cyber Crime: Evidence from Panel Data FGLS Estimator, International Journal of Cyber Criminology Vol 12 Issue 2 July – December 2018.

SEMESTER-II MONGODB (THEORY)

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

- To provide students the knowledge and skills to master the NoSQL database mongoDB.
- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	To provide students the right skills and knowledge needed to	Knowledge
	develop Applications on mongoDB.	
CO2	To provide students the right skills and knowledge needed to	Knowledge
	run Applications on mongoDB	
CO3	Develop MongoDB programs from JavaScript shell.	Create
CO4	Explain the detailed architecture, define objects, load data,	Explain
	query data and performance tune of MongoDB	
CO5	Evaluate query optimization in MongoDB	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	L	Μ	L	Μ	Μ	Μ	L
CO2	S	S	S	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ
CO3	L	S	Μ	Μ	S	Μ	L	L	S	S	Μ	L
CO4	S	S	Μ	L	L	S	S	S	Μ	Μ	S	S
CO5	S	L	Μ	S	L	Μ	S	Μ	L	L	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I - GETTING STARTED

A database for the modern web – MongoDB through the JavaScript shell – Writing programs using MongoDB- MongoDB Document Model.

UNIT II - APPLICATION DEVELOPMENT

Document-oriented data – Principles of schema design – Designing an e-commerce data model – Nuts and bolts on databases, collections, and documents. Queries and aggregation – E-commerce queries – MongoDB's query language – Data Types in MongoDB -Aggregating orders – Aggregation in detail.

(8 HOURS)

UNIT III – UPDATES, ATOMIC OPERATIONS, AND DELETES

A brief tour of document updates – E-commerce updates – Atomic document processing – MongoDB updates and deletes. Indexing and query optimization: Indexing theory – Indexing in practice.

UNIT IV – REPLICATION

Overview – Replica sets – Master-slave replication – Drivers and replication. Shading: Overview – A sample shard cluster – Querying and indexing a shard cluster – Choosing a shard key.

UNIT V- DEPLOYMENT AND ADMINISTRATION

Deployment – Monitoring and diagnostics – Maintenance – Performance troubleshooting.

SUGGESTED READINGS

- Shakuntala Gupta Edward. (2018). Practical Mongo DB , 2nd edition, Apress Publications, ISBN 1484206487
- 2. Rick Copeland. (2017). MongoDB Applied Design Patterns, 1st Edition, O"Reilly Media Inc.
- 3. Mike Wilson. (2017). Building Node Applications with MongoDB and Backbone, O"Reilly Media Inc.
- 4. Kyle Banker. (2016). MongoDB in Action. Manning Publications Co.
- 5. Gautam Rege, (2016). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd
- 6. David Hows. (2016). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485

WEBSITES

- 1. http://www.mongodb.org/about/production-deployments/
- 2. http://docs.mongodb.org/ecosystem/drivers/
- 3. http://www.mongodb.org/about/applications/
- 4. http://www.mongodb.org/
- 5. https://nptel.ac.in/courses/106106156/

JOURNALS:

 Swetha Siriah, Bhushan Deshpande, Deepak Asudani,"MongoDB with Privacy Access Control ", International Journal of Research and Review, Vol.5; Issue: 6; June 2018

(8 HOURS)

(8 HOURS)

SEMESTER-II INTERNET OF THINGS (THEORY)

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

- 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 standardization of IoT
- To Understand the communication technologies in IoT Know the IoT protocols and web of things
- To integrate IoT with billing and networks

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Understand building blocks of Internet of Things and	Understand
	characteristics.	
CO2	Understand IoT protocols, Web of Things and Integrating IOT.	Understand
CO3	Understand the application areas of IOT	Understand
CO4	Adapt the revolution of Internet in Mobile Devices, Cloud &	Apply
	Sensor Networks	
CO5	Understand about communication technologies used in IoT	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L
CO2	S	S	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	Μ
CO3	S	Μ	Μ	S	Μ	L	L	S	S	L	Μ	L
CO4	S	Μ	L	L	S	S	S	Μ	Μ	S	S	S
CO5	L	Μ	S	L	Μ	S	Μ	L	L	S	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I - INTRODUCTION

(8 HOURS)

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 – DNA of 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 protocols - cellular Internet access protocol - Machine-to-machine protocol - Modbus – KNX – Zigbee Architecture.

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 -Connectivity Technologies. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – 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. HonboZhou . (2018). The Internet of Things in the Cloud: A Middleware Perspective--CRC Press .
- 2. Olivier Hersent, Omar Elloumi and David Boswarthick . (2017). The Internet of Things: Applications to the Smart Grid and Building Automation . Wiley.
- 3. Olivier Hersent, David Boswarthick, Omar Elloumi. (2017). The Internet of Things Key applications and Protocols. Wiley.
- 4. Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.).(2016). Architecting the Internet of Things– Springer.
- 5. David Easley and Jon Kleinberg . (2016). Networks, Crowds, and Markets: Reasoning About a Highly Connected World , Cambridge University Press.

WEBSITES

- 1. https://www.ibm.com/blogs/internet-of-things/what-is-the-iot
- 2. https://www.i-scoop.eu/internet-of-things-guide
- 3. https://iot-analytics.com
- 4. https://nptel.ac.in/courses/106105166/

JOURNALS:

 Mardianabinti , Mohamad NoorWan, HaslinaHassan," Current research on Internet of Things (IoT) security: A survey", Computer Networks, Volume 148, 15 January 2019, Pages 283-294

(8 HOURS)

(8 HOURS)

(8 HOURS)

SEMESTER-II ARTIFICIAL INTELLIGENCE (THEORY)

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

- To gain a historical perspective of AI and its foundations.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- To experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- To experiment with a machine learning model for simulation and analysis.

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Demonstrate fundamental understanding of the history of	Understanding
	artificial intelligence (AI) and its foundations.	
CO2	Apply basic principles of AI in solutions that require problem	Knowledge
	solving, inference, perception, knowledge representation, and	
	learning.	
CO3	Demonstrate awareness and a fundamental understanding of	Understanding
	various applications of AI techniques in intelligent agents,	
	expert systems, artificial neural networks and other machine	
	learning models.	
CO4	Demonstrate proficiency developing an application in an 'AI	Create
	language', expert system shell, or data mining tool.	
CO5	Demonstrate proficiency in applying scientific method to	Apply
	models of machine learning.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	L	L	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L
CO2	S	S	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	Μ
CO3	S	Μ	Μ	S	Μ	L	L	S	S	L	Μ	L
CO4	S	Μ	L	L	S	S	S	Μ	Μ	S	S	S
CO5	L	Μ	S	L	Μ	S	Μ	L	L	S	Μ	Μ

S-Strong; M-Medium; L-Low

UNIT I - PROBLEM SOLVING AND AI

(8 HOURS)

Puzzles and Games – Problem States and operators – Heuristic programming – state space representations – state descriptions – graph notations – non- deterministic programs.

UNIT II - STATE SPACE SEARCH METHODS

Breadth first and depth first search -forward and backward, state-space, blind, heuristic, problemreduction, A, A*, AO*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms – admissibility – optimality of algorithms – performance measures – problem reduction representations - AND/OR graphs and higher-level state space.

UNIT III – PROBLEM REDUCTION SEARCH METHODS

Cost of solution trees – ordered search – alpha beta and minimum procedure – theorem proving in predicate calculus – syntax, semantics, Her brand universe: variables, qualifiers, unification, resolvents.

UNIT IV – PREDICATE CALCULUS IN PROBLEM SOLVING (8 HOURS)

Answer extraction process - resolution - Automatic program writing - predicate calculus - proof finding methods.

UNIT V – EXPERT SYSTEMS

Expert systems and conventional programs - expert system organization - Knowledge engineering: knowledge representation techniques – knowledge acquisition – acquiring knowledge from experts - automating knowledge acquisition -Building an expert system - difficulties in developing an expert system.

SUGGESTED READINGS

- 1. Flasiński, Mariusz. (2018). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.
- 2. Chandra .S.S.V. (2017). Artificial Intelligence and Machine Learning. Kindle Edition.
- 3. Dr.R.P.Das. (2017). Neural Networks and Fuzzy Logic. 1st Edition, Tata Mcgraw Hill, Delhi
- Elain Rich and Kevin Knight. (1991). Artificial Intelligence. McGraw Hill. 4.
- 5. Donald A Waterman. (2016). A Guide to Expert Systems, Tech knowledge series in knowledge engineering.

WEBSITES

- 1. https://www.tutorialspoint.com > Artificial Intelligence
- 2. www-formal.stanford.edu/jmc/whatisai/node3.html
- 3. https://nptel.ac.in/courses/106105079/

JOURNALS

1. Tim Miller, Explanation in artificial intelligence: Insights from the social sciences, Artificial Intelligence Volume 267, February 2019, Pages 1-38

(8 HOURS)

(8 HOURS)

SEMESTER-II MACHINE LEARNING (THEORY)

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

- To introduce students to the basic concepts and techniques of Machine Learning.
- To become familiar with regression methods, classification methods, clustering methods.
- To become familiar with Dimensionality Reduction Techniques.
- To identify the characteristics of datasets and compare the trivial data and big data for various applications.
- To solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Gain knowledge about basic concepts of Machine Learning	Knowledge
CO2	Identify machine learning techniques suitable for a given	Knowledge
	problem	
CO3	Apply Dimensionality reduction techniques	Apply
CO4	Ability to identify the characteristics of datasets and compare	Ability
	the trivial data and big data for various applications.	
CO5	Ability to solve problems associated with batch learning and	Ability
	online learning, and the big data characteristics such as high	
	dimensionality, dynamically growing data and in particular	
	scalability issues.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	L
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	Μ	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	Μ	L
CO4	L	L	S	S	S	Μ	Μ	S	L	L	S	S
CO5	S	L	Μ	S	Μ	L	L	S	S	L	Μ	Μ

S-Strong; M-Medium; L-Low

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 – perceptron – 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–clusteringtrees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first -order rule learning.

UNIT V – REINFORCEMENTLEARNING

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. Y. S. Abu Mostafa, M. Magdon-Ismail, and H.-T. Lin. (2017).Learning from Data, AMLBook Publishers.
- 2. P. Flach. (2016). "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press.
- 3. K. P. Murphy. (2016). Machine Learning: A probabilistic perspective, MIT Press.
- 4. D. Barber. (2016). Bayesian Reasoning and Machine Learning, Cambridge University Press
- 5. C. M. Bishop. (2016). Pattern Recognition and Machine Learning. Springer.

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/
- 5. https://nptel.ac.in/courses/106105152/

JOURNALS

 Zachary C. Lipton, Jacob Steinhardt, Research for Practice: Troubling Trends in Machine-Learning Scholarship, Communications of the ACM, June 2019, Vol. 62 No. 6, Pages 45-53

(8 HOURS)

(8 HOURS)

(8 HOURS)

SEMESTER-II DEEP LEARNING (THEORY)

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

- To understand the fundamentals of neural networks
- To learn about the working principles of back propagation networks
- To learn about introduction and different architectures of neural network
- To understand the selection of various Parameters in BPN.
- To explore the ideas of Adaptive Resonance Theory.

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Adequate knowledge about basic Concepts of Neural Networks	Knowledge
CO2	Understand the concept of fuzziness involved in various systems.	Understand
CO3	Understand comprehensive knowledge of fuzzy sets, Crisp sets, Fuzzy relations and Crisp relations.	Understand
CO4	Learn the concepts of Fuzzy Rule Based System and Defuzzification Methods	Analyze
CO5	Learn about the working principles of back propagation networks	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	L
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	Μ	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	Μ	L
CO4	L	L	S	S	S	Μ	Μ	S	L	L	S	S
CO5	S	L	Μ	S	Μ	L	L	S	S	L	Μ	Μ

S-Strong; M-Medium; L-Low

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.

(8 HOURS)

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.
- Phil Kim. 2017. Matlab Deep Learning: With Machine Learning, Neural Networks and 4. Artificial Intelligence, A Press, Third Edition.
- 5. Ian Good Fellow, Yoshua Bengio and Aaron Courville. 2017. Deep Learning, MIT Press, First Edition.
- Joshua F. Wiley. 2016. Deep Learning Essentials, Packt Publications, First Edition. 6.

WEBSITES

- 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-s191introduction- to-deep-learning-january-iap-2020/
- 5. www.kaggle.com/learn/intro-to-deep-learning

JOURNALS

Simone A. Ludwig, Applying a Neural Network Ensemble to Intrusion Detection 1. Journal of Artificial Intelligence and Soft Computing Research, Volume 9, Issue 3 (2019), pp. 177–188

(8 HOURS)

(8 HOURS)

SEMESTER-II J2EE - PRACTICAL (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

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Understand the In-depth concepts of JEE	Knowledge
CO2	Understand the in-depth Life cycle of servlets and JSP.	Understand
CO3	Learn how to communicate with databases using Java.	Understand
CO4	Handle Errors and Exceptions in Web Applications	Analyse
CO5	Use NetBeans IDE for creating J2EE Applications	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	Μ
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	Μ	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	L	Μ
CO4	L	L	S	S	S	Μ	Μ	S	L	L	S	L
CO5	S	L	Μ	S	Μ	L	L	S	S	L	S	S

S-Strong; M-Medium; L-Low

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 retrieve cookies information
- 6. Build a JAVA Bean for opening an applet from JAR file.
- 7. Write a program to add controls in BEAN.
- 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 an applet into JSP page.
- 11. Write a program to create JDBC connectivity with Oracle Database.
- 12. Write a program to create RMI client and server to invoke remove method of RMI server

SUGGESTED READINGS

- 1. Jim Keogh. (2018). The Complete Reference J2EE 1stedtion New Delhi: Tata McGraw Hill.
- 2. Duane, K. Fields., & Mark, A. Kolb. (2017). Web Development with Java Server Pages (1st ed.). Pune: Manning Publications.
- Rod Johnson. (2017). J2EE Development without EJB 1st edition. New Delhi:Wiley Dream Tech.
- 4. Rod Johnson., & Rod Johnson, P.H. (2016). Expert One-On-One J2EE Design and Development. New Delhi: John Wiley & Sons.
- 5. Paul, J. Perrone., Venkata, S. R. Chaganti., Venkata S. R. Krishna., & Tom Schwenk. (2016). J2EE Developer's Handbook. New Delhi: Sams Publications.
- 6. Joseph, J. Bambara et al. (2016). J2EE Unleashed (1st ed.). New Delhi:Tech Media.

WEBSITES

- 1. https://www.oracle.com/technetwork/java/javaee/appmodel-135059.html
- 2. https://www.geeksforgeeks.org/introduction-java-servlets/
- 3. http://media.datadirect.com/download/docs/jdbc/alljdbc/jdbcconnect/j2ee.html
- 4. https://www.javatpoint.com/ejb-tutorial
- 5. https://www.javatpoint.com/jsp-tutorial
- 6. https://nptel.ac.in/courses/106105191/

SEMESTER-II MONGODB - PRCTICAL

(PRACTICAL)

4H – 2C

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

Course Objectives

- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB
- To understand replication and sharing in MongoDB

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Understand the right skills and knowledge needed to develop	Knowledge
	Applications on MongoDB	
CO2	Understandthe right skills and knowledge needed to run	Knowledge
	Applications on MongoDB	
CO3	Analyze writing MongoDB programs from JavaScript shell.	Understand
CO4	Explain the detailed architecture, define objects, load data,	Analyse
	query data and performance tune of MongoDB	
CO5	Perform query optimization in MongoDB	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	Μ
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	Μ	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	L	Μ
CO4	L	L	S	S	S	Μ	Μ	S	L	L	S	L
CO5	S	L	Μ	S	Μ	L	L	S	S	L	S	S

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

2.

- 1. Write a MONGODB query to perform the following operations.
 - a. Create an employee database employee id and employee name.
 - b. Declare an array variable.
 - c. Insert documents to database.
 - Write a MONGODB query to perform the following operations.
 - a. Create an employee database with employee id and employee name.
 - b. Display all documents using find ().
 - c. Display a document with employee name ="Smith "
 - d. Display all documents with employee id greater than 2.

- 3. Write a MONGODB query to perform the following operations.
 - a. Create an employee database with employee id and employee name.
 - b. Display only 2 documents with employee id greater than 2 using hasnext().
 - c. Sort the documents.
 - d. Count the number of documents.
- 4. Write a MONGODB query to perform query to perform the following operations.
 - a. Create an employee database with employee id and employee name.
 - b. Remove a document with a employee id=2.
 - c. Update a document with a new employee.
 - d. Display all documents.
- 5. Write a MONGODB query to perform the following operations using NUMBER data type.
 - a. Save numbers from 1 to 50.
 - b. Display the count of numbers.
 - c. Display numbers with operator's lt and gt.
 - d. Display documents with explain().
- 6. Write a MONGODB query to create to create, display and drop a collection using capped collections.
- 7. Write a MONGODB query to perform the following operations.
 - a. Create a book database.
 - b. Display all documents with pretty().
 - c. Display documents with and, or operations.
 - Write a MONGODB query to perform the following operations.
 - a. Create a book database.
 - b. Perform sum, avg, minimum, maximum operations.
- 9. Write a MONGODB query to perform the following operations.
 - a. Create Sales database.
 - b. Perform push, addtoset, last and first functions.
- 10. Write a MONGODB query to query to perform the following operations.
 - a. Declare and assign a value to a variable.
 - b. Make use of add and multiply methods.

SUGGESTED READINGS

8.

- 1. Shakuntala Gupta Edward. (2018). Practical Mongo DB , 2nd edition, Apress Publications, ISBN 1484206487
- 2. Rick Copeland. (2017). MongoDB Applied Design Patterns, 1st Edition, O"Reilly Media Inc.
- 3. Mike Wilson. (2017). Building Node Applications with MongoDB and Backbone, O"Reilly Media Inc.
- 4. Kyle Banker. (2016). MongoDB in Action. Manning Publications Co.
- 5. Gautam Rege, (2016). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd
- 6. David Hows. (2016). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485

WEBSITES

- 1. http://www.mongodb.org/about/production-deployments/
- 2. http://docs.mongodb.org/ecosystem/drivers/
- 3. http://www.mongodb.org/about/applications/
- 4. http://www.mongodb.org/
- 5. https://nptel.ac.in/courses/106106156/

SEMESTER-III ANGULAR JS (THEORY)

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

- To utilize Angular JS formats adequately
- To make the perplexing structures quickly
- To confine web applications to take into account world-wide groups of on lookers
- To make Secured web applications 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)

COs	Course Outcomes	Blooms Level
CO1	Apply an AngularJS Single Page Application from scratch	Understanding
CO2	Understand an awesome User Interface	Knowledge
CO3	Create and bind controllers with JavaScript	Understanding
CO4	Create a separate the model, view, and controller layers of your	Create
	application and implement them using AngularJS	
CO5	Integrate and enhance Angular applications with other useful JavaScript	Apply
	libraries such as Node.js	
CO6	Test the application using AngularJS	Ability

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	Μ
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	L	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	S	L
CO4	L	L	S	S	S	Μ	Μ	S	L	L	Μ	S
CO5	S	L	Μ	S	Μ	L	L	S	S	L	L	S

S-Strong; M-Medium; L-Low

Unit I – Introducing Angular JS

Introduction to Angular JS- MVC Architecture- Conceptual Overview- Setting up the Environment- Starting Out with Angular JS.- First Application- Understanding ng-attributes. Number and String Expressions- Object Binding and Expressions- Working with Arrays-Forgiving Behavior- Understanding Data binding.

Unit II – Directives and Controllers

Directives: Conditional Directives- Styles Directives- Mouse and Keyboard Events Directives **Understanding Controllers** – Programming Controllers& \$scope object- Adding Behavior to a

(10 HOURS)

(10 HOURS)

Scope Object- Passing Parameters to the Methods- Having Array as members in Controller Scope. Nested Controllers and Scope Inheritance- Multiple Controllers and their scopes.

Unit III – Angular JS Filters and Forms

Filters: Built-In Filters- Uppercase and Lowercase Filters- Currency and Number Formatting Filters-order By Filters- Creating Custom Filters- **Using Simple Form**- Working with Select and Options- Input Validations-Using CSS classes- Form Events- Custom Model update triggers-Custom Validations- Error Handling with Forms- Other Form Controls.

Unit IV – Modules and Services in Angular JS

Why Module? –Module Loading and Dependencies- Recommended Setup of Application-Creation vs Retrieval. **Angular JS Services**- Understanding Services- Developing Creating Services- Using a Service- Injecting Dependencies in a Service. Introduction to SPA- Creating HTML Templates- Configuring Route Provider.

Unit V – Server Communications, Testing And Routing

Server Communication Using \$http: Fetching Data with \$http Using GET- Advanced \$http. **Unit Testing:** What and Why?-Introduction to Karma- Jasmine: Spec Style of Testing- Writing a Unit Test for Our Controller –Running the Unit Test. **Routing Using ng Route:** Routing in a Single-Page Application- Using Route- Routing Options-Additional Configuration.

SUGGESTED READINGS

- 1. Chandermani Arora, Kevin Hennessy, 2018. "Angular 6 by Example: Get up andrunning with Angular by building modern real-world web apps", 3rd Edition, KindleEdition.
- 2. AgusKurniawan,2014."AngularJSProgrammingbyExample",FirstEdition
- 3. AdamFreeman,2014."ProAngularJS",FirstEdition,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-bookforAngularJS]
- 4. https://www.edx.org/course/angularjs-framework-fundamentals

NPTEL

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

(10 HOURS)

(9 HOURS)

(9 HOURS)

SEMESTER-III SOFTWARE TESTING AND QUALITY ASSURANCE

(THEORY)

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

- To understand the basics of testing, test planning & design and test team organization
- To study the various types of tests in the life cycle of the software product.
- To build design concepts for system testing and execution
- To learn the software quality assurance, metrics, defect prevention techniques
- To learn the techniques for quality assurance and applying for applications.

Course Outcomes (COs)

COs	Course Outcomes	Blooms Level
CO1	Perform functional and nonfunctional tests in the life cycle of	Understanding
	the software product.	
CO2	Understand system testing and test execution process.	Knowledge
CO3	Create test cases for software testing techniques.	Understanding
CO4	Identify defect prevention techniques and software quality	Create
	assurance metrics.	
CO5	Apply techniques of quality assurance for typical applications.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	Μ
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	L	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	S	L
CO4	L	L	S	S	S	Μ	Μ	S	L	L	Μ	S
CO5	S	L	Μ	S	Μ	L	L	S	S	L	L	S

S-Strong; M-Medium; L-Low

UNIT I – Software Testing - Concepts, Issues, And Techniques

Quality Revolution, Verification and Validation, Failure, Error, Fault, and Defect, Objectives of Testing, Testing Activities, Test Case Selection White-Box and Black, test Planning and design, Test Tools and Automation, Power of Test. Test Team Organization and Management-Test Groups, Software Quality Assurance Group, System Test Team Hierarchy, Team Building.

UNIT II – System Testing

System Testing - System Integration Techniques-Incremental, Top-DownBottom-Up Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration. Built- in Testing. functional testing - Testing a Function in Context. Boundary Value Analysis, Decision Tables. acceptance

(10 HOURS)

(10 HOURS)

testing - Selection of Acceptance Criteria, Acceptance Test Plan, Test Execution Test. software reliability - Fault and Failure, Factors Influencing Software, Reliability Models

UNIT III – System Test Categories

System test categories Taxonomy of System Tests, Interface Tests Functionality Tests. GUI Tests, Security Tests Feature Tests, Robustness Tests, Boundary Value Tests Power Cycling Tests Interoperability Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Regulatory Tests. Test Generation from FSM models- State-Oriented Model. Finite-State Machine Transition Tour Method, Testing with State Verification. Test Architectures-Local, distributed, Coordinated, Remote. system test design- Test Design Factors Requirement Identification, modeling a Test Design Process Test Design Preparedness, Metrics, Test Case Design Effectiveness. system test execution- Modeling Defects, Metrics for Monitoring Test Execution. Defect Reports, Defect Causal Analysis, Beta testing, measuring Test Effectiveness.

UNIT IV – Software Quality

Software quality - People 's Quality Expectations, Frameworks and ISO-9126, McCall 's Quality Factors and Criteria – Relationship. Quality Metrics. Quality Characteristics ISO 9000:2000 Software Quality Standard. Maturity models- Test Process Improvement, Testing Maturity Model-Estimation Techniques.

UNIT V – Software Quality Assurance

Quality Assurance - Root Cause Analysis, modeling, technologies, standards and methodologies for defect prevention. Fault Tolerance and Failure Containment - Safety Assurance and Damage Control, Hazard analysis using fault-trees and event-trees. Comparing Quality Assurance Techniques and Activities. QA Monitoring and Measurement, Risk Identification for Quantifiable Quality Improvement. Case Study: FSM-Based Testing of Web-Based Applications.

SUGGESTED READINGS

- 1. Stephan Goericke.(2019). The Future of Software Quality Assurance, Stephan Goericke, Springer International Publishing.
- 2. Sandeep Desai, Abhishek Srivastava. (2018). Software Testing: A Practical Approach.PHI, New Delhi.
- 3. KshirasagarNakPriyadarshi Tripathy. (2017). Software Testing and Quality Assurance-Theory and Practice, John Wiley & Sons Inc.
- 4. Milind Limaye. (2016). Software Quality Assurance, , TMH ,New Delhi.
- 5. Jeff Tian. (2016). Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, John Wiley & Sons, Inc., Hoboken, New Jersey..
- 6. Daniel Galin. (2016). Software Quality Assurance From Theory to Implementation, Pearson Education Ltd UK.

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- $1. \qquad https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm$
- 2. https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-thebasics-of-software-quality-management/
- 3. http://softwaretestingfundamentals.com/software-quality-assurance/
- 4. https://www.softwaretestinghelp.com/software-quality-assurance/
- 5. https://nptel.ac.in/courses/106105150/
- 6. http://ijiet.com/wp-content/uploads/2016/04/15.pdf
- 7. https://www.springer.com/journal/11219

(9 HOURS)

(9 HOURS)

(10 HOURS)

SEMESTER-III DIGITAL IMAGE PROCESSING

(THEORY)

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

- To make the students learn the fundamental theories and techniques of digital image processing.
- To study the mathematical transforms necessary for image processing, image manipulation and a preliminary understanding of Computer Vision.
- To make students to understand the image degradation and enhancement.
- To understand the basic relationships between pixels in an image
- To know various segmentation techniques, and object descriptors.

Course Outcomes (COs)

COs	Course Outcomes	Blooms Level
CO1	Perform image manipulations and analysis in many different	Understanding
	fields.	
CO2	Apply knowledge of computing mathematics science and	Knowledge
	engineering to solve problems in multidisciplinary research.	
CO3	Implement the understanding in sharpening the image.	Understanding
CO4	Perform the image segmentation using the compression method.	Create
CO5	Understand the image to represent in an region.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	Μ
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	L	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	S	L
CO4	L	L	S	S	S	Μ	Μ	S	L	L	Μ	S
CO5	S	L	Μ	S	Μ	L	L	S	S	L	L	S

S-Strong; M-Medium; L-Low

UNIT I – Introduction

Digital image processing - Origins of digital image processing- Examples of fields that use digital image Processing-Fundamental steps in digital image processing- Components of an image processing System-Representing digital image.

UNIT II – Basic Relationships Between Pixels

Basic gray level transformations- Histogram processing - Basic spatial filtering- Smoothing special filtering- Image Degradation/ Restoration process- Noise Models.

(10 HOURS)

(10 HOURS)

46
UNIT III – Image Segmentation

Thresholding - Edge Based Segmentation Edge Operators; Line Detection, Corner Detection – Region Based Segmentation Region Growing Based Segmentation, Region Splitting, Region Merging, Split and Merge – Matching. Image Compression: Error Criterion - Lossy Compression - Lossless Compression.

UNIT IV – Shape Representation and Description

Region Identification - Contour Based Representation and Description – Region Based Shape Representation and Description.

UNIT V – Image Recognition

Introduction – Statistical Pattern Recognition - Neural Net- Syntactic Pattern Recognition - Graph Matching – Clustering-Texture Image Analysis-Image Data Compression.

SUGGESTED READINGS

- 1. Rafael, C. Gonzalez., & Richard, E. Woods. (2018). Digital Image Processing (3rd ed.). New Delhi:Pearson Education.
- 2. Milan Sonka., Vaclav Hlavac.,& Roger Boyle. (2017). Image Processing Analysis and Machine Vision (2nd ed.). New Delhi: Vikas Publishing House.
- Chanda, B., & Dutta Majumder, D. (2016). Digital Image Processing and Analysis (1st ed.). New Delhi: Prentice Hall of India.
- Nick Efford. (2016). Digital Image Processing A Practical introduction using JAVA (1st ed.). New Delhi: Pearson Education Limited.

WEBSITES

- 1. http://www.cs.dartmouth.edu/farid/tutorials/fip.pdf
- 2. http://www.imageprocessingbasics.com/
- 3. http://www.astropix.com/HTML/J_DIGIT/TOC_DIG.HTM
- 4. https://nptel.ac.in/courses/117105079/
- 5. https://nptel.ac.in/courses/117105135/

JOURNALS

- 1. https://link.springer.com/journal/10278
- 2. https://sites.google.com/site/ijcsis/digital-image-processing
- 3. http://www.ciitresearch.org/dl/index.php/dip
- 4. https://ieeexplore.ieee.org/document/4336327

47

(10 HOURS)

(9 HOURS)

(9 HOURS)

SEMESTER – III INTERNETWORKING WITH TCP/IP

(THEORY)

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

- To understand about subnets using IP classes
- To understand the key features and functions of TCP
- To understand how basic routing works including the use of routing protocols.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN
- To compare and contrast IP routing protocols

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Ability to analyze and differentiate networking protocols used	Ability
	in TCP/IP protocol suite.	
CO2	Understand IP Addressing Fundamentals	Understand
CO3	Understand IPv4 forwarding and routing.	Understand
CO4	Learn about host name resolution and the Domain Name System (DNS).	Apply
CO5	Learn about services and operations of DHCP Servers and Domain Name Servers	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	Μ
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	L	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	S	L
CO4	L	L	S	S	S	Μ	Μ	S	L	L	Μ	S
CO5	S	L	Μ	S	Μ	L	L	S	S	L	L	S

S-Strong; M-Medium; L-Low

UNIT I – Introduction

Introduction — Protocols and Standards – OSI layers- TCP/IP layers- Comparison between OSI and TCP/IP – Internetworking Devices – Routers-Bridges- Switches-Hubs – Classful Addressing –Classless Addressing – Subnetting –Super netting

UNIT II – ARP & RARP

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

(10 HOURS)

(10 HOURS)

UNIT III – Routing Protocol

Unicast Routing Protocol: Intra Domain and Inter Domain Routing – Distance Vector Routing – RIP – Link State Routing – OSPF – Path Vector Routing – BGP – Multicast Routing – Multicast Routing Protocols. Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

UNIT IV – BOOTP, DHCP

Host Configuration – Introduction – DHCP Operation – Configuration – DNS-Need for DNS -Name Space – DNS in Internet – Resolution – DNS Messages – Types of Record-Compression – Encapsulation-Registrars-DDNS- Security of DNS.

UNIT V – Remote Login

Telnet-Concepts - Time-Sharing Environment -Network Virtual Terminal (NVT) -Embedding – Options- Symmetry – Sub-option Negotiation - Controlling the Server - Out-of-Band Signaling -Escape Character -Modes of Operation - User Interface - Security Issue–Secure Shell –FTP – User Agent -SMTP –POP-IMAP- SNMP – Components-SMI-MIB-UDP Ports –Voice over IP.

SUGGESTED READINGS

- 1. Jason Edelman, Scott Lowe (2018), Network Programmability and Automation, O'Reilly
- 2. Jeff Doyle, Jennifer DeHaven Carroll (2012), Routing TCP/IP, Volume 1 (2nd Edition), Cisco Press
- 3. Behrouz, A. Forouzan. (2018). TCP/IP Protocol Suite. 3rd edition. Tata McGraw Hill Publication. New Delhi:
- 4. Andrews, S. Tanenbaum. (2017).Computer Networks. 4thedition.:Prentice Hall of India Private Ltd. New Delhi.
- 5. Buck Graham. (2017). TCP/IP Addressing. 2nd edition. Harcount India Private Limited. New Delhi
- 6. Douglas, E. Comer. (2016). Computer Networks and Internets. 4th edition. Pearson Education. New Delhi.
- 7. William Stallings. (2016). Data and Communication Network. 8th edition. Tata McGraw Hill. New Delhi

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- 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
- 5. https://nptel.ac.in/courses/106105081/

JOURNALS

 Koppisetti Giridhar, C. Anbuananth, N. Krishnaraj. Research on Various Routing Techniques in Wireless Ad-hoc Networks, International Journal of Recent Technology and Engineering (IJRTE), Volume-8, Issue-1S4, June 2019

(10 HOURS)

(9 HOURS)

(9 HOURS)

4H - 4C

End Semester Exam: 3 Hours

• To describe the history and recent developments of AR

To introduce Augmented Reality, the tool of Industry 4.0

- To provide the technological components needed for AR
- To impart the importance of augmented reality in Industry 4.0 with real-time examples

SEMESTER-III AUGMENTED REALITY (THEORY)

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

• To discuss the revolution and impact of AR

Course Outcomes

Course Objectives:

COs	Course Outcomes	Blooms Level
CO1	Ability to analyze and differentiate networking protocols used	Ability
	in TCP/IP protocol suite.	
CO2	Understand IP Addressing Fundamentals	Understand
CO3	Understand IPv4 forwarding and routing.	Understand
CO4	Learn about host name resolution and the Domain Name System (DNS).	Apply
CO5	Learn about services and operations of DHCP Servers and Domain Name Servers	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Μ	L	L	Μ	L	Μ	Μ	Μ	Μ	L	Μ	Μ
CO2	Μ	S	Μ	Μ	Μ	L	L	Μ	Μ	S	L	Μ
CO3	Μ	S	Μ	L	L	S	S	L	Μ	S	S	L
CO4	L	L	S	S	S	Μ	Μ	S	L	L	Μ	S
CO5	S	L	Μ	S	Μ	L	L	S	S	L	L	S

S-Strong; M-Medium; L-Low

UNIT I – Introduction to Augmented Reality

History of AR - Augmented reality characteristics – Difference between Augmented Reality and Virtual Reality – AR technological components – Technologies used in AR – Feature Extraction

- Hard ware components - AR devices - Importance of AR - Real world uses of AR - AR types

– Software tools available for AR.

(10 HOURS)

UNIT II – Technologies needed for Augmented Reality

Hardware technology – virtual scenes – 3D objects – AR components – Display – HMD – Eyeglasses– Contact Lenses – significance of AR – AR powered devices – AR application development drawbacks– Compatibility – Performance – AR libraries – Motion tracking – Environmental understanding –Anchors.

UNIT III – Technology Integration and Implementation of AR (10 HOURS)

Technology use and integration in industrial settings – Assistive training to faculty members – Planning and administration for implementation – AR implications – Practical data – AR labs – Platforms to form AR content– Coordinated utilization of AR application s – Hands-on preparation.

UNIT IV – Augmented Reality and Virtual Reality for Micro Learning (9 HOURS)

Micro learning techniques – Utilizing VR for learning – VR for Practical online assessment – VR infographics – Virtual case considerations - Utilizing AR for learning – Accessible learning – sensible data– elevated learner engagement - VR technology – Components of VR – VR hardware – VR applications– Civil Engineering – Real Estate – Biology and Medicine – Virtual Mall – VR in Education – VirtualLaboratory – Factory Planning – Automobile Industry.

UNIT V – Tools and Applications of Augmented Reality

Tools available for Augmented Reality and Recognition – Software Tools – Google Poly – Unity –software approaches – recognition types – native software solutions – ARKit – ARCore – software development kit - Cloud services - AR business applications – weather prediction – market prediction– smart cities - AR application for Education - AR application for Healthcare sector – Agriculture –Civil Engineering – Architecture – Archaeology – Crime and Security – Games – IoT - Use cases –Social Media – Gaming – Education – Healthcare – Shopping and Business.

SUGGESTED READING

1 Kaliraj, P., Devi, T. (2021). Innovating with Augmented Reality: Applications in Education and Industry (P. Kaliraj, Ed.) (1st ed.). CRC Press, Taylor & Francis Group, Boca Raton, ebook ISBN 9781003175896 Auerbach Publications. https://doi.org/10.1201/9781003175896

(10 HOURS)

(9 HOURS)

SEMESTER-III INTRODUCTION TO ROBOTICS (THEORY)

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:

- To provide an introduction to Robotics and Automation including robot classification, design and selection, analysis and applications in industry.
- To provide information on various types of end effectors, their design, interfacing and selection.
- To provide the details of operations for a variety of sensory devices that are used on robot, the meaning of sensing, classification of sensor, that measure position, velocity & acceleration of robot joint.
- To familiarize the basic concepts of transformations performed by robot.
- To perform kinematics and to gain knowledge on programming of robots.

COs	Course Outcomes	Blooms Level
CO1	understand basic components of robotics, classification of	Ability
	robots and their applications.	
CO2	Understand IP Addressing Fundamentals	Understand
CO3	Understand IPv4 forwarding and routing.	Understand
CO4	Learn about host name resolution and the Domain Name	Apply
	System (DNS).	
CO5	Learn about services and operations of DHCP Servers and	Apply
	Domain Name Servers	

COURSE OUTCOMES:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	Μ	L	Μ	Μ	Μ	Μ	L	L	Μ	Μ
CO2	S	Μ	Μ	Μ	L	L	Μ	Μ	S	S	L	Μ
CO3	S	Μ	L	L	S	S	L	Μ	S	S	S	L
CO4	L	S	S	S	Μ	Μ	S	L	L	L	Μ	S
CO5	L	Μ	S	Μ	L	L	S	S	L	L	L	S

S-Strong; M-Medium; L-Low

UNIT I

(10 HOURS)

(10 HOURS)

Introduction: Definition and origin of robotics – Different types of robotics – Generation of robots – degrees of freedom -Asimov's law of robotics – dynamic stabilization of robots

UNIT II

Power Sources, Sensors and Grippers: Different kind of drives - Hydraulic, Pneumatic and electric – Determination of HP and Gear Ratio of motors – Steering Control – PWM, Differential drives –

Sensors-Range Detectors, Machine Vision, Tactile Sensors – Robot Manipulator – Construction, Dynamics and Control -Different kind of end effectors and grippers – Design Considerations

UNIT III

Kinematics and Path Planning: Forward and Inverse Kinematic Equations – Multiple Solution Jacobian Work Envelop – Hill Climbing Methods -Various Robot Programming Languages

UNIT IV

Robot Operating System: Robot Software platform and its needs – Meta Operating System -History of ROS and ecosystem – ROS development environment – Communication concepts of ROS – ROS Commands – ROS Tools

UNIT V

Programming with ROS: Creating Subscriber and Publisher Nodes – Parameters setting and reading across nodes – TurtleBot 3 development environment setup-Software, Hardware – TurtleBot 3 Simulation with Gazebo – Pre-determined Robot sequence programming in Gazebo

SUGGESTED READINGS

- 1. 1.Mikell P. Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G. Odrey, "Industrial Robotics: Technology, Programming, and Applications"
- 2. Bijoy k. Ghosh "Control in Robotics and Automation: Sensor-Based Integration"
- 3. YoonSeokPyo, HanCheol Cho, RyuWoon Jung, TaeHoon Lim, "ROS Robot Programming"
- 4. Morgan Quigley, Brian Gerkey, William D. Smart,"Programming Robots with ROS: A Practical Introduction to the Robot Operating System"
- 5. Roland Siegwart and Illah R. Nourbakhsh,"Introduction to Autonomous Mobile Robots"
- 6. Getting Started with Robotics <u>https://see.stanford.edu/Course/CS223A</u>

(10 HOURS)

(9 HOURS)

(9 HOURS)

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53

SEMESTER-III INTELLIGENT AGENTS (THEORY)

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:

- To gain insight about automation using Intelligent Agents
- To understand the learning behavior and functioning of Agents
- To develop knowledge in the application domains of Agents
- To Understand how learning happens in multiagent systems
- Evaluate current trends and applications of intelligent agents

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental concepts in intelligent agents.	Remember
CO2	Understand agent communications and interactions	Understand
CO3	Analyze various agent negotiation strategies	Analyze
CO4	Understand how learning happens in multiagent systems	Understand
CO5	Evaluate current trends and applications of intelligent agents	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	Μ	L	Μ	Μ	Μ	Μ	L	L	Μ	Μ
CO2	S	Μ	Μ	Μ	L	L	Μ	Μ	S	S	L	Μ
CO3	S	Μ	L	L	S	S	L	Μ	S	S	S	L
CO4	L	S	S	S	Μ	Μ	S	L	L	L	Μ	S
CO5	L	Μ	S	Μ	L	L	S	S	L	L	L	S

S-Strong; M-Medium; L-Low

UNIT I

(10 HOURS)

Introduction to Intelligent Autonomous Agents- Motivations for agent-based computing - Abstract Architectures for Intelligent Agents - Key concepts and models of reasoning agents – deductive reasoning - symbolic reasoning - reactive reasoning - practical reasoning - Rational decision making and handling uncertainty.

UNIT II

(10 HOURS)

Agent Interactions – Communication and cooperation – Ontology fundamentals – Building blocks – Ontology Languages – Software tools for ontologies – Agent Communication Languages. Conceptual Foundations of Communication in Multiagent systems - Traditional Software Engineering Approaches - Traditional AI Approaches - Commitment-Based Multiagent Approaches - Engineering with Agent Communication

UNIT III

Cooperative Distributed Problem Solving - Task Sharing and Result Sharing - Coordination -Multiagent Planning and Synchronization - Negotiation and Bargaining - Aspects of Negotiation - Game-Theoretic Approaches for Single-Issue Negotiation - Game-Theoretic Approaches for Multi-Issue Negotiation - Heuristic Approaches for Multi-Issue Negotiation - Argumentation-Based Negotiation

UNIT IV

Multiagent Learning - Introduction - Challenges in Multiagent Learning - Reinforcement Learning for Multiagent Systems - Evolutionary Game Theory as a Multiagent Learning paradigm - Swarm Intelligence as a Multiagent Learning Paradigm -Neuro-Evolution as a Multiagent Learning Paradigm - Case Study in Multiagent Learning

UNIT V

Agent Applications - Agents for Workflow and Business Process Management - Agents for Distributed Sensing - Agents for Information Retrieval and Management - Agents for Electronic Commerce - Agents for Human–Computer Interfaces - Agents for Virtual Environments - Agents for Social Simulation - Deploying agents within a simulated environment - Practical reasoning strategies for computational markets

SUGGESTED READINGS

- 1. 1.Michael Wooldridge: An Introduction to Multi Agent Systems (2nd ed.). Wiley, 2009
- 2. G. Weiss (ed.): Multi-Agent Systems A Modern Approach to Distributed Artificial Intelligence (2nd ed.). MIT Press, 2013
- 3. 3.M. Wooldridge: Reasoning about Rational Agents. MIT Press, 2000
- 4. 4.Yoav Shoham, Kevin Leyton-Brown, Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations, 2008.

WEBSITES

1. 1.<u>https://nptel.ac.in/courses/106/105/106105077/</u>

10 HOURS)

(9 HOURS)

(9 HOURS)

SEMESTER – III ANGULAR JS - PRACTICAL (PRACTICAL)

3H - 2C

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

Course Objectives

- To utilize Angular JS formats adequately
- To make the perplexing structures quickly
- To confine web applications to take into account world-wide groups of on lookers
- To make Secured web applications 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)

COs	Course Outcomes	Blooms
		Level
CO1	To apply an AngularJS Single Page Application from scratch	Remember
CO2	To build an awesome User Interface	Understand
CO3	To create and bind controllers with JavaScript	Create
CO4	To separate the model, view, and controller layers of your application and	Understand
	implement them using AngularJS	
CO5	To integrate and enhance Angular applications with other useful JavaScript	Evaluate
	libraries such as Node.js	
CO6	Test the application using AngularJS	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	Μ	L	Μ	Μ	Μ	Μ	L	L	Μ	Μ
CO2	S	Μ	Μ	Μ	L	L	Μ	Μ	S	S	L	Μ
CO3	S	Μ	L	L	S	S	L	Μ	S	S	S	L
CO4	L	S	S	S	Μ	Μ	S	L	L	L	Μ	S
CO5	L	Μ	S	Μ	L	L	S	S	L	L	L	S
CO6	L	L	Μ	L	Μ	Μ	Μ	Μ	L	L	Μ	Μ

S-Strong; M-Medium; L-Low

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. Create an Employee Database and apply filters on it.
- 7. Implement Dependency Injection in AngularJS with and without introspection.
- 8. Write a program to Fetch data with \$http Using GET.

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- 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 JS by Example: Get up and running with Angular by building modern real-world webapps", 3rd Edition, Kindle Edition.
- 2. Agus Kurniawan, 2014. "Angular JS Programming by Example", FirstEdition
- 3. Adam Freeman, 2014. "ProAngular JS", 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-III SOFTWARE TESTING AND QUALITY ASSURANCE - PRACTICAL (PRACTICAL) 3H – 2C

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

End Semester Exam:3 Hours

Course Objectives

- To highlight the strategies for software testing and understand the concept of testing tools.
- To explain methods of capturing, specifying, visualizing and analysing software requirements.
- To understand concepts and principles of software design and user-centric approach and principles of effective user interfaces with the help of testing tool.
- To know basics of testing and understanding concept of Testing Tools.
- To learn the criteria and design for test cases.

Course Outcomes (COs)

COs	Course Outcomes	Blooms Level
CO1	Work effectively as leader/tester of a development team to	Remember
	deliver quality software artifacts.	
CO2	Implement a given software design using sound development	Understand
	practices.	
CO3	Verify, validate, assess and assure the quality of software	Create
	artifacts.	
CO4	Design test cases suitable for a software development for	Understand
	different domains.	
CO5	Identify suitable tests to be carried out.	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	Μ	L	Μ	Μ	Μ	Μ	L	L	Μ	Μ
CO2	S	Μ	Μ	Μ	L	L	Μ	Μ	S	S	L	Μ
CO3	S	Μ	L	L	S	S	L	Μ	S	S	S	L
CO4	L	S	S	S	Μ	Μ	S	L	L	L	Μ	S
CO5	L	Μ	S	Μ	L	L	S	S	L	L	L	S

S-Strong; M-Medium; L-Low

List of Programs

Using Testing Tool: (Selenium)

- 1. Conduct a test suite for any two WEB LINKS.
- 2. Program to Select Checkbox in Selenium Driver.
- 3. Program to Select Radio Button in Selenium Driver.
- 4. Write a Program to Scroll a web page in Selenium WebDriver.
- 5. Write and test a program to login a specific webpage.
- 6. Create Locators in Selenium using IDE.

7. Find Element and Find Elements in Web using Selenium WebDriver.

SUGESTED READINGS

- 1. Stephan Goericke. (2019). The Future of Software Quality Assurance, Stephan Goericke, Springer International Publishing.
- 2. Sandeep Desai, Abhishek Srivastava. (2018). Software Testing: A Practical Approach. PHI, New Delhi.
- 3. Kshirasagar Nak Priyadarshi Tripathy. (2017). Software Testing and Quality Assurance-Theory and Practice, John Wiley & Sons Inc.
- 4. Milind Limaye.(2016). Software Quality Assurance, , TMH ,New Delhi.
- 5. Jeff Tian. (2016). Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, John Wiley & Sons, Inc., Hoboken, New Jersey..
- 6. Daniel Galin. (2016). Software Quality Assurance From Theory to Implementation, Pearson Education Ltd UK.

WEBSITES

- 1. https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
- 2. https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-thebasics-of-software-quality-management/
- 3. http://softwaretestingfundamentals.com/software-quality-assurance/
- 4. https://www.softwaretestinghelp.com/software-quality-assurance/
- 5. https://nptel.ac.in/courses/106105150/
- 6. http://ijiet.com/wp-content/uploads/2016/04/15.pdf
- 7. https://www.springer.com/journal/11219

SEMESTER – III ORGANIZATIONAL BEHAVIOUR (THEORY)

Instruction Hours/week: L: 3 T: 0 P: 0

3H – 2C

2023 - 2024

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

COURSE OBJECTIVES:

- 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 themembers of the organization

COURSE OUTCOMES:

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

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S	S			
CO2								S	S			
CO3								S	S			
CO4								S	S			
CO5								S	S			
CO6								S	S			

Mapping with Programme Outcomes

S-Strong; M-Medium; L-Low

UNIT I Organization behaviour: Introduction

(7 HOURS)

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

UNIT II Behaviour and Personality

Attitudes – Sources - Types - Functions of Attitudes. Values – Importance - Types of Values. Personality – Determinants of personality- Theories of Personality - psycho-analytical, social learning, job-fit, and trait theories.

UNIT III Perception

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.

UNIT IV Group and Stress Management

Foundation of Group Behavior - Types of Groups - Stages of Group Development - Group Norms - Group Cohesiveness – Stress – Causes of stress – Effects of Occupational Stress- Coping Strategies for Stress.

UNIT V Organization Culture and Change

Organizational culture- Characteristics of Culture- Types of Culture – Creating and Maintaining an Organizational Culture. Organizational change – Meaning - Forces for Change - Factors in Organizational Change - Resistance to change- Overcoming resistance to change.

SUGGESTED READINGS:

- Fred Luthans. (2017). Organizational Behavior: An Evidence Based Approach, 12thedition, Mc Graw Hill Education, New Delhi.
- 2. Steven Mcshane and Mary Ann Von Glinow (2017), Organizational Behavior, 6th edition, McGrawHill Education, New Delhi
- 3. Robbins, S. P., and Judge, T.A. (2016). Organizational Behaviour. (16thedition).New Delhi: PrenticeHall of India.
- 4. Laurie J. Mullins (2016), Management and Organisational behaviour, 10thedition, Pearson Education, New Delhi
- 5. Robbins, S. P., and Judge, T.A. (2016). Essentials of Organizational Behavior.13 edition, PearsonEducation.

WEBSITES:

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

(7 HOURS)

(7 HOURS)

(8 HOURS)

(7 HOURS)

61

SEMESTER – III MATERIALS CHARACTERIZTION (THEORY)

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

- To Study materials is always important, for any application, including fabrication of satellites.
- To introduce various methods available for characterizing the materials. The characterization of materials specifically addresses that portfolio with which researchers and educators must have working familiarity.
- To provide an introduction to materials characterization and its importance
- To discuss different types of characterization techniques and their uses.
- To introduce the students to the principles of optical and electron microscopy, X-ray diffraction and various spectroscopic techniques Introduction:
- To understand the materials characterization and available techniques

Course Outcomes (COs)

- Handle with X-ray, thermal, microscopic, and electrical methods of characterization.
- Understand and describe the fundamental principles behind the methods of characterization which are included in the curriculum
- Analyze, interpret and present observations from the different methods.
- Evaluate the uncertainty of observations and results from the different methods.
- Understand the history of materials science with basic understanding of metals, binary alloys, magnetic materials, dielectric materials and polymers
- Understand nucleation, growth and phase transformation kinetics

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										S		
CO2										S		
CO3										S		
CO4										S		
CO5										S		
CO6										S		

Mapping with Programme Outcomes

S-Strong; M-Medium; L-Low

UNIT – I

(7 HOURS)

X-ray techniques for materials characterization X-ray diffraction: Principle, measuring system and applications for characterization of powdered materials. X-ray diffraction profile and analysis: FWHM and line broadening, Crystallite size effect and Scherrer formula, Effect of strain (tensile vs compressive, uniform vs. non-uniform) Introduction to Extended X-ray absorption fine structure (EXAFS), Surface extended X-ray absorption (SEXAFS).

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UNIT – II

Microscopic techniques Principles, instrumentations and applications of Optical microscope, Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) for characterization of different samples. Energy dispersive X-ray microanalysis (EDS) - Basic aspects of Atomic force microscopy (AFM).

UNIT – III

Spectroscopic methods Principle, instrumentation and applications of UV-Visible Diffuse Reflectance (UV-Vis DRS) spectroscopy, Ft-Ir, Raman and Fluorescence spectroscopy. Hand of experience on operation of UV-Vis-DRS, FT-IR, Raman and data analysis..

UNIT – IV

Thermoanalytical Methods Principle, instrumentation and applications of Thermogravimetric Analysis (TGA), Differential Temperature Analysis (DTA) and Differential Scanning Calorometry (DSC). Factors affecting the TGA/DTA/DSC results and their interpretations. Hand on on experience of operation of TG/DSC and data analysis.

UNIT - V

Electroanalytical Techniques Voltammetric principles, hydrodynamic voltammetry, stripping voltammetry, cyclic voltammetry, criteria of reversibility of electrochemical reactions, quasireversible and irreversible processes, qualitative and quantitative analysis current-potential relation applicable for Linear Sweep Voltammetry (LSV) and Cyclic Voltammetry (CV), interpretation of cyclic voltammograms and parameters obtainable from voltammograms. Hand on experience on operation of CV and data analysis.

SUGGESTED READINGS:

- Theory and Applications of UV Spectroscopy, H.H.Jaffe and M.Orchin, IBH-Oxford. 1.
- 2. Inorganic spectroscopic methods, A.K. Brisdon, Oxford Chem. Primers, 1997, New York.
- Applied Electron Spectroscopy for Chemical Analysis Ed. H. Windawi and F.L.Ho, Wiley 3. Inter science.
- Introduction to Spectroscopy, Pavia, Brooks/Cole Cenage, 4th edition, 2009, Belmont. 4.
- Introduction to Photoelectron Spectroscopy, P.K.Ghosh, John Wiley. 5.
- 6. Fundamental of Molecular Spectroscopy, C. N. Banwell and E. McCash, Tata McGraw Hill, 4th edition, 1994, New Delhi.

(8 HOURS)

(7 HOURS)

(7 HOURS)

SEMESTER – III NUMERICAL METHODS AND PROGRAMMING (THEORY)

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

- Computational physics may be broadly defined as 'the science of using computers to assist in the solution of physical problems, and to further physics research.
- To equip the students of M.Sc. Physics with knowledge of programming in C, roots of equation, interpolation, curve fitting, numerical differentiation, numerical integration, solution of ordinary differential equations
- To introduce students to computational methods for simulating physical systems and solving problems arising in physics and astronomy, as well as in other related fields
- Computers now play a role in almost every branch of physics like large scale quantum mechanical calculations in nuclear, atomic, molecular and condensed matter physics, large scale calculations in such fields as hydrodynamics, astrophysics, plasma physics, meteorology and geophysics etc.
- The huge increase in the power of computers in recent years has made an impact on the role of computational physics.
- This paper gives idea about different types of computations involved in Physics, like curve fitting, interpolation, extrapolation, numerical calculations etc.

Course Outcomes (COs)

- Programme numerical methods and their implementation like applying to problem in
- physics, including modeling of classical physics to quantum system as well as data analysis (Linear and non-linear).
- Analysis techniques for propagating error, representing data graphically. Create, solve and interpret basic mathematical tool.
- Program independently computers using leading-edge tools,
- formulate and computationally solve a selection of problems in physics,
- Use the tools, methodologies, language and conventions of physics to test and Communicate ideas and explanations.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		S							Μ		
CO2	S		S							Μ		
CO3	S		S							Μ		
CO4	S		S							Μ		
CO5	S		S							Μ		
CO6	S		S							Μ		

Mapping with Programme Outcomes

S-Strong; M-Medium; L-Low

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UNIT – I

Errors, different type of errors. Representation of numbers in computer, computer arithmetic, zero in floating point number.

UNIT – II

Operators -finite differences, average, differential, etc., their inter-relations. Difference of polynomials. Difference equation. Interpolation. Lagrange's methods, error terms. Uniqueness of interpolating polynomial.

UNIT – III

Newton's fundamental interpolation. Forward, backward and central difference interpolations. Interpolation by iteration. Spline interpolation, comparison with Newton's interpolation. Hermite's interpolation. Bivariate interpolation, Lagrange and Newton's methods. Inverse interpolation.

UNIT - IV

Approximation of function. Least square method. Use of orthogonal polynomials. Approximation by Chebyshev polynomials, Max-min principle. Economization of power series.

$\mathbf{UNIT} - \mathbf{V}$

Python Programming - Loops- Conditional statements - Functions - Object-oriented programming - Array computing - 2 and 3D visualizations.

SUGGESTED READINGS:

- 1. E. Balagurusamy, "Numerical Methods", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1999
- W.H. Press, B.P. Flannery et al., "Numerical Recipes: Art of Scientific Computing", 3rd 2. Edition, Cambridge Press, 2007.
- 3. J. M. Mathews and K. Fink, "Numerical Methods using MATLAB", 4rd Edition, Prentice Hall Publication, 2004
- Dr. B.S. Grewal, "Numerical Methods in Engineering and Science ", Khanna Publication. 4.
- Robert J schilling, Sandra l harries, " Applied Numerical Methods for Engineers using 5. MATLAB and C.", Thomson Brooks/cole.
- Richard L. Burden, J. Douglas Faires, "Numerical Analysis", Thomson / Brooks/cole 6.
- 7. John. H. Mathews, Kurtis Fink, "Numerical Methods Using MATLAB", Prentice Hall publication
- 8. JAAN KIUSALAAS, "Numerical Methods in Engineering with MATLAB", Cambridge Publication

WEBSITES:

https://archive.nptel.ac.in/content/ 1.

(7 HOURS)

(7 HOURS)

(8 HOURS)

(7 HOURS)

SEMESTER – III ROBOTICS AND AUTOMATION PROCESS (THEORY)

Instruction Hours/week: L: 3 T: 0 P: 0

3H – 2C

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- 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)

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S		S				S	Μ		
CO2			S		S				S	Μ		
CO3			S		S				S	Μ		
CO4			S		S				S	Μ		
CO5			S		S				S	Μ		
CO6			S		S				S	Μ		

S-Strong; M-Medium; L-Low

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. <u>https://www.tutorialspoint.com/uipath/uipath_robotic_process_automation_introduction.ht</u> <u>m</u>
- 2. <u>https://www.javatpoint.com/rpa</u>
- 3. <u>https://onlinecourses.nptel.ac.in/noc19_me74/preview</u>

(8 HOURS)

(7 HOURS)

3H - 2C

SEMESTER-III NUTRITION AND DIETETICS

(THEORY)

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

Course Objectives

- Fundamentals of food, nutrients and their relationship to health
- Respect to deriving maximum benefit from available food resources
- Understanding of the consequences of vitamin and mineral deficiency/excess of vitamin
- Respect to the nutrition in adult age
- Nutrition deficiency diseases and their consequences
- Food adulteration and prevention of food adulteration

Course Outcomes (CO's)

COs	Course Outcomes	Blooms
COS	Course Outcomes	Level
C01	The fundamentals of nutrition and their relationship to health	Understand
CO2	To derive maximum benefits from available food resources	Understand
CO3	The consequences of vitamin and mineral deficiency/excess of	Understand
	vitamin	
CO4	The nutrition in adult age	Remember
CO5	Nutrition deficiency diseases and their consequences	Remember
CO6	The sources of food adulteration and measures to prevent it	Create

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							S					
CO2							S					
CO3							S					
CO4							S					
CO5							S					
CO6							S					

S-Strong; M-Medium; L-Low

UNIT – 1

Basic concepts in food and nutrition- Understanding relationship between food, nutrition and health, Functions of food- Physiological, psychological and social. Dietary guidelines for Indians food pyramid. Junk foods and its causes.

$\mathbf{UNIT} - \mathbf{II}$

(7 HOURS)

(7 HOURS)

Nutrients - Functions, dietary sources and clinical manifestations of deficiency/ excess of the following nutrients: Carbohydrates, lipids and proteins, Fat soluble vitamins-A, D, E andK, Water

soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C, Minerals – calcium, iron and iodine

UNIT – III

Adult nutrition, Physiological changes, RDA, nutritional guidelines, nutritional concerns and healthy food choices -Adult, Pregnant woman, Lactating mother, Elderly. Nutrition during childhood -Growth and development, nutritional guidelines, nutritional concerns and healthy food choices -Infants, Preschool children, School children, Adolescents. Nutritional needs of nursing mothers and infants, determinants of birth weight and consequences of low birth weight, Breastfeeding biology, Breastfeeding support and Counselling, Infant and young child feeding and care - Current feeding practices and nutritional concerns, guidelines for infant and young child feeding, Breast feeding, weaning and complementary feeding. Assessment and management of moderate and severe malnutrition among children, Micronutrient malnutrition among preschool children. Child health and morbidity, neonatal, infant and child mortality.

UNIT – IV

Introduction to Nutritional deficiency diseases -Causes, symptoms, treatment, prevention of the following: Protein Energy Malnutrition (PEM), Vitamin A Deficiency (VAD), Iron Deficiency Anaemia (IDA), Iodine Deficiency Disorders (IDD), Zinc Deficiency, Flurosis Nutritional needs during pregnancy, common disorders of pregnancy (Anaemia, HIV infection, Pregnancy induced hypertension), relationship between maternal diet and birth. Maternal health and nutritional status, maternal mortality and issues relating to maternal health.

$\mathbf{UNIT} - \mathbf{V}$

(7 HOURS)

(7 HOURS)

Dietetics: Diet for diabetes mellitus-Nutrition recommendations for patient with diabetes, Meal planning, Exchange list of different food groups, Glycemic index-based formulation of diet for diabetic individual, Diabetic diets menu wise. Diet for Cardiovascular Diseases -Dietary management and general guidelines for coronary heart disease, Dietary recommendations of WHO. Diet for Acute cardiac diseases. Influence of diet on carcinogenesis, Dietary risk factors and cancers at various sites in the human body, diet therapy, diet for cancer patients, managing eating problems during treatment. Hormonal imbalance-Poly cystic ovarian syndrome, hypogonadism, cushing syndrome. Causes of hormonal imbalance. Treatment- Dietary and stress management protocols to be followed.

SUGGESTED READING

- Gordon M, Wardlaw and Paul M. (2012). Perspectives in Nutrition: U.S.A. McGraw Hill Publishers. 9rd Edition. New Delhi
- 2. Srilakshmi.B. (2014) Nutrition Science: New Age International (P) Ltd. Publishers.4th Edition. New Delhi.
- Srilakshmi.B. (2015) Food Science:. New Age International (P) Ltd. Publishers. 6nd Edition., New Delhi
- 4. Darshan Sohi (2012). A Comprehensive Textbook of Nutrition & Therapeutic Diets. Jaypee Brothers Medical Publishers Pvt. Ltd.

(8 HOURS)

SEMESTER-III CYBER FORENSICS (THEORY)

3H - 2C

2023-2024

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

End Semester Exam: 3 Hours

Course Objectives

- To understand about computer forensics and investigations.
- To know about digital evidence and crime.
- To analyse and validate forensics data.
- To know about e-mail investigation.
- To understand about Mobile device forensics.

Course Outcomes (COs)

Cos	Course Outcomes	Blooms Level
CO1	Define, understand and explain various investigation	Remember
	procedures and summarize duplication of digital evidence.	
CO2	Apply the knowledge of digital evidences.	Understand
CO3	Design and develop various forensics tools and analyse the	Create
	network forensics.	
CO4	Demonstrate the systematic study of high-tech forensics	Understand
CO5	Understand the importance of reports.	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	Μ	Μ				Μ				
CO2	S	S	Μ	Μ				Μ				
CO3	S	S	Μ	Μ				Μ				
CO4	S	S	Μ	Μ				Μ				
CO5	S	S	Μ	Μ				Μ				

S-Strong; M-Medium; L-Low

Unit I – Computer forensics and investigations

Computer forensics and investigations as a profession – Preparing for computer investigations – Taking a systematic approach–Procedures for corporate high-tech investigations–Data recovery work stations and software– Conducting an investigation.

Unit II – Data Acquisition

Data acquisition – Storage formats for digital evidence – Validating data acquisitions – Processing crime and incident scenes–Identifying digital evidence–Collecting evidence in private sector incident scenes – Preparing for search-seizing digital evidence at the scene-storing digital evidence –Reviewing a case.

(7 HOURS)

Unit III – Computer Forensics Tools

Current computer forensics tools–Software tools–Hardware tools–The Macintosh file structure and boot process – Computer forensics analysis and validation – Addressing data –Hiding techniques.

Unit IV – Network Forensics

Virtual machines – Network forensics – Developing standard procedures – Live acquisitions – email investigations – Investigating e-mail crimes and violations – Understanding e-mail servers – Cell phone and mobile device forensics.

Unit V – Mobile Device Forensics

Understanding mobile device forensics – Acquisition procedures –Report writing for high-tech investigations – Importance of reports – Guidelines for writing reports –Expert testimony in high-tech investigations.

SUGGESTED READINGS

- 1. Bill Nelson, Amelia Phillips and Christopher Steuart. (2018). Computer Forensics and Investigations, Cengage Learning, 5th Edition.
- Eoghan Casey. (2017). "Handbook of Digital Forensics and Investigation", Academic Press, 1st Edition,
- 3. John R Vacca, (2016). "Computer Forensics", Cengage Learning, 2nd Edition.

WEB LINKS

- 1. www.cps.brockport.edu/~shen/cps301/figures/figure1.pdf
- 2. www.forensicsguru.com/devicedataextractionsimcell.php
- 3. www.nptel.ac.in/courses/106101060
- 4. www.samsclass.info/121/ppt/ch11.ppt
- 5. www.garykessler.net/library/role_of_computer_forensics.html
- 6. www.ukessays.com/essays/information-technology/computer-forensics-and-crime investigations-information-technology-essay.php

(7 HOURS)

(7 HOURS)

(8 HOURS)

3H – 2C

SEMESTER – III PERSONAL FINANCE AND PLANNING (THEORY)

Instruction Hours/week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives:

- 1. To familiarize with regard to the concept of Investment Planning and its methods
- 2. To examine the scope and ways of Personal Tax Planning;
- 3. To analyze Insurance Planning and its relevance
- 4. To develop an insight in to retirement planning and its relevance.
- 5. To construct an optimal portfolio in real life situations

Course Outcomes:

COs	Course Outcomes	Blooms
		Level
CO1	Familiarize with regard to the concept of Investment Planning and its	Understand
	methods	
CO2	Examine the scope and ways of Personal Tax Planning;	Analyze
CO3	Analyze Insurance Planning and its relevance	Analyze
CO4	Develop an insight in to retirement planning and its relevance.	Create
CO5	Construct an optimal portfolio in real life situations	Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S	Μ			
CO2								S	Μ			
CO3								S	Μ			
CO4								S	Μ			
CO5								S	Μ			

S-Strong; M-Medium; L-Low

UNIT – I: Introduction to Financial Planning

Financial goals, Time value of money, steps in financial planning, personal finance/loans, education loan, car loan & home loan schemes. Introduction to savings, benefits of savings, management of spending & financial discipline, Net banking and UPI, digital wallets, security and precautions against Ponzi schemes and online frauds such as phishing, credit card cloning, skimming.

UNIT – II: Investment Planning

Process and objectives of investment, Concept and measurement of return & risk for various assets class, Measurement of portfolio risk and return, Diversification & Portfolio formation. Gold Bond; Real estate; Investment in Greenfield and brownfield Projects; Investment in fixed income

(7 HOURS) inance/loans.

instruments- financial derivatives& Commodity market in India. Mutual fund schemes including SIP; International investment avenues.

UNIT – III: Personal Tax Planning

Tax Structure in India for personal taxation, Scope of Personaltax planning, Exemptions and deductions available to individuals under different heads ofincome and gross total income, Special provision u/s 115BAC vis-à-vis General provisions of the Income-tax Act, 1961. Tax avoidance versus tax evasion.

UNIT – IV: Insurance Planning

Need for Protection planning. Risk of mortality, health, disability and property. Importance of Insurance: life and non-life insurance schemes. Deductions available under the Income-tax Act for premium paid for different policies.

UNIT – V: Retirement Benefits Planning

Retirement Planning Goals, Process of retirement planning, Pension plans available in India, Reverse mortgage, New Pension Scheme. Exemption available under the Income-tax Act, 1961 for retirement benefits.

SUGGESTED READINGS

- 1. Indian Institute of Banking & Finance. (2017). Introduction to Financial Planning. New Delhi: Taxmann Publication.
- 2. Pandit, A. (2014). The Only Financial Planning Book that You Will Ever Need. Mumbai: Network Publications Ltd.
- 3. Sinha, M. (2008). Financial Planning: A Ready Reckoner. New York: McGraw Hill Education.
- 4. Halan, M. (2018). Let's Talk Money: You've Worked Hard for It, Now Make It Work for You. New York: HarperCollins Publishers.
- 5. Tripathi, V. (2017). Fundamentals of Investment. New Delhi: Taxmann Publication.

(8 HOURS)

(7 HOURS)

SEMESTER – III CHEMISTRY IN EVERYDAY LIFE (THEORY)

Instruction Hours/week: L: 3 T: 0 P: 0

3H – 2C

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- Gain knowledge in the importance of chemistry in food industry.
- To understand the chemistry of medicines and cosmetics.
- To study about chemistry in energy utilization and storage process.
- Know about the chemistry of soaps, detergents and textiles.
- To learn about the chemistry behind the polymers, fuel and agriculture.

Course Outcomes (CO's)

COs	Course Outcomes	Blooms Level
CO1	Illustrate the importance of chemistry in food industry.	Apply
CO2	Explain the chemistry of medicines and cosmetics.	Understand
CO3	Utilization of chemistry concepts in energy storage devices	Apply
CO4	Discuss about the chemistry of soaps, detergents and textiles.	Understand
CO5	Apply the concept of chemistry in polymers, fuel and	Apply
	agriculture industry.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1									S	Μ
CO2									S	Μ
CO3									S	Μ
CO4									S	Μ
CO5									S	Μ

S-Strong; M-Medium; L-Low

UNIT - I Importance of Chemistry in food

Chemicals in food, colouring agents, artificial preservatives, flow stabilizers, binding substance, flavours and sweeteners, antioxidants, minerals, vitamins. Chemistry at the breakfast table, raising agents- gluten, the taste maker- glutamic acid, stimulants-Caffeine, chemistry of onion, garlic and curcumin.

UNIT - II Chemistry in medicines and cosmetics

Elements in the human body, drugs and their classification, drug-target interaction, action of different classes of drugs, antiseptics and disinfectants. Cosmetics: Chemistry behind the lotions, fragrances, talcum powder, sunblock and sunscreen, toothpaste, lipsticks, nail polishes.

UNIT - III Chemistry in energy

Solar energy - fuel from sun light - splitting of water - hydrogen from sunlight - hydrogen

(7 HOURS)

(7 HOURS)

(8 HOURS)

economy - fuel cells - batteries - photovoltaics - stealing the sun - nuclear energy - nuclear fission and fusion - production of electricity by a nuclear reactor - radioactivity and the hazards of radioactivity - living with nuclear power.

UNIT - IV Importance of chemistry in soaps, detergents and textiles (7 HOURS)

Detergents and soaps, types of soaps and detergents, saponification, cleansing action of soaps and detergents, perfumes used in soaps. Textiles: Chemistry behind wool, silk, jute, cotton, glass fibre, polyester, acrylic, nylon, and other raw materials.

UNIT - V Chemistry of polymers, fuel and agriculture

(7 HOURS)

Polymers, types, polyethylene, plastics, disposal of plastics, degradation of polymers and plastics using nano materials. Petrochemistry, petrol, diesel, LPG, CNG, kerosene, oils, and other fuels. Agriculture: fertilizers, herbicides, insecticides, and fungicides.

SUGGESTED READINGS

- 1. Tripathy, S. N., & Sunakar Panda (2004). *Fundamentals of Environmental Studies* (II Edition). New Delhi: Vrianda Publications Private Ltd.
- 2. Arvind Kumar (2004). *A Textbook of Environmental Science*. New Delhi: APH Publishing Corporation.
- 3. Anubha Kaushik, C. P., & Kaushik (2004). *Perspectives in Environmental Studies*. New Delhi: New Age International Pvt. Ltd. Publications.
- 4. Seymour R. B., & Charles, E. (2003). Seymour's Polymer Chemistry: An Introduction. Marcel Dekker, Inc.
- 5. Stocchi. E, (1990). *Industrial Chemistry* (Vol–I). UK: Ellis Horwood Ltd.
- 6. Jain, P. C., & Jain, M. (2004). *Engineering Chemistry*. Delhi: Dhanpat Rai & Sons.
- 7. Sharma, B. K., & Gaur, H. (1996). *Industrial Chemistry*. Meerut: Goel Publishing House.

SEMESTER – III FERMENTATION TECHNOLOGY (THEORY)

Instruction Hours/week: L: 3 T: 0 P: 0

3H - 2C

0 Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objective

- To encompass the use of microorganisms in the manufacture of food or industrial products on the basis of employment.
- Get equipped with a theoretical and practical understanding of industrial microbiology
- Appreciate how microbiology is applied in the manufacture of industrial products
- Know how to source microorganisms of industrial importance from the environment
- Know about the design of bioreactors, factors affecting growth and production, heat transfer, oxygen transfer
- Understand the rationale in medium formulation & amp; design for microbial fermentation, and sterilization of medium and air.

Course Outcome

COa	Course Outcomes	Blooms
COS	Course Outcomes	Level
CO1	Provides knowledge in the large-scale production of industrial	Understand
	product, and teaches the modern employment trends to cater the needs	
	of industry.	
CO2	Students will differentiate the types of fermentation processes	Apply
CO3	Understand the biochemistry of various fermentations	Understand
CO4	Identify techniques applicable for Improvement of microorganisms	Analyze
	based on known biochemical pathways and regulatory mechanisms	
CO5	Comprehend the techniques and the underlying principles in	Apply
	downstream processing	
CO6	Students can able to explore the practical skills in research activities.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1							Μ	Μ			
CO2							Μ	Μ			
CO3							Μ	Μ			
CO4							Μ	Μ			
CO5							Μ	Μ			
CO6							Μ	Μ			

S-Strong; M-Medium; L-Low

EXPERIMENTS

- 1. Provides knowledge in the large-scale production of industrial product, and teaches the modern employment trends to cater the needs of industry.
- 2. Students will differentiate the types of fermentation processes
- 3. Understand the biochemistry of various fermentations
- 4. Identify techniques applicable for Improvement of microorganisms based on known biochemical pathways and regulatory mechanisms
- 5. Comprehend the techniques and the underlying principles in downstream processing
- 6. Students can able to explore the practical skills in research activities.

Unit – I: Basics of fermentation processes

Definition, scope, history, and chronological development of the fermentation industry. Component parts of the fermentation process. y. Component parts of fermentation process. Microbial growth kinetics, batch and continuous, direct, dual or multiple fermentations; scaleup of fermentation, comparison of batch and continuous culture as investigative tools, examples of the use of fed batch culture.

UNIT – II: Isolation and Preservation

Isolation, preservation, and strain improvement of industrially important microorganisms. Use of recombination system (Parasexual cycle, protoplast fusion techniques), application of recombinant strains, and the development of new fermentation products.

UNIT – III: Screening and Inoculum development

Screening (primary and secondary screening); detection and assay of fermentation products (Physicochemical assay, biological assays). Inoculum development, criteria for transfer of inoculum, development of inoculum: Bacteria, Fungi and Yeast.

UNIT – IV: Microbial Production

Fermentation type reactions (Alcoholic, bacterial, mixed acid, propionic acid, butanediol and acetonebutanol). Microbial production of enzymes (amylases, Proteases, cellulases, pectinases and lipases) primary screening for producers, large scale production. Immobilization methods.

UNIT – V: Alcohols and Beverages

Fermentative production of industrial alcohol, production of beverages. Production of organic acids: citric acid, aminoacids: glutamic acid, production of vitamins. fungal enzymes and Single cell protein.

SUGGESTED READING:

- 1. Casida, L.E.2007. Industrial microbiology, New age international (P) Ltd., New Delhi.
- 2. Clark, D.P and Pazdernik, N.J.2009. Biotechnology applying the genetic revolution, Elsevier Academic Press, UK.
- 3. Glazer, A and Nikaido.1995. Microbial biotechnology fundamentals of applied microbiology, W.H.Freemn and company, USA.
- 4. Glick, B.R and Pasternak, J.J.2003. Molecular Biotechnology Principles and Applications of Recombinant DNA, 3rd edition, ASM Press, USA.
- 5. Harider, S.I. and Ashok, A. 2009. Biotechnology, A Comprehensive Training Guide for the Biotechnology Industry, CRC Press, New York.
- 6. Sridhar, S.2010. Industrial Microbiology, Dominant Publishers, New Delhi.
- 7. Tanuja.S and Purohit, S.S. 2008. Fermentation Technology, Agrobios Publication, Jodhpur, India.

(8 HOURS)

(7 HOURS)

(7 HOURS)

(7 HOURS)

(7 HOURS)

77

SEMESTER – III ENGLISH FOR COMPETITIVE EXAMINATION (THEORY)

Instruction Hours/week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

- To train learners to crack competitive exams •
- To know of various tools that is essential for Competitive Exams •
- To enhance their ability to speak in English and face an interview. •
- To make the student apply, prepare and clear the competitive exams. •
- To prepare the student to concentrate, stay positive and confident. •
- To take even failure at ease and continue the target of clearing competitive exams.

Course Outcomes

COa	Course Outcomes						
COS	Course Outcomes	Level					
CO1	The student may settle in life with a government job.	Apply					
CO2	The student may develop various skills	Understand					
CO3	The successful student may guide other students to success.	Understand					
CO4	Analyse logical reasoning questions, error analysis, and correct usage of	Analyse					
	words.						
CO5	Develop the knowledge of grammatical system of English language.	Apply					
CO6	Elaborate on the correct structure of sentence	Understand					

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S		Μ		
CO2								S		Μ		
CO3								S		Μ		
CO4								S		Μ		
CO5								S		Μ		
CO6								S		Μ		

S-Strong; M-Medium; L-Low

UNIT – I: Grammar

Number-Subject, Verb and Agreement-Articles-Sequences of Tenses-Common Errors

UNIT – II: Word Power

Idioms and Phrases-One word substitution-Synonyms-Antonyms-Words often confused

UNIT – III: Paragraph

Expansion of an idea

(8 HOURS)

3H – 2C

(7 HOURS)

UNIT – IV: Writing

Essay- Letters-Memos-Agenda-Resume writing

UNIT – V: Speaking

Public Speaking-Group Discussion-Interview-Spoken English

SUGGESTED BOOKS

1. V. Saraswathi, Maya K. Mudbhatkal (2014). English for Competitive Examinations. Emerald: Chennai.

(7 HOURS)

79

SEMESTER-III SERICULTURE (THEORY)

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

- To apply knowledge and skills of seri-biotechnology for development new mulberry variety and silkworm breeds suitable for varied agro-climatic zones.
- To apply tools and techniques of biostatics for critical analysis and interpretation of data accrueded.
- To use bioinformatics tools and techniques for the analysis and interpretation of bimolecular data for better understating mulberry and silkworm.
- To demonstrate communication skills, scientific writing, data collection and interpretation abilities in all the fields of seri-biotechnology.
- Thorough knowledge and application of good laboratory and good manufacturing practices in sericulture and biotech industries.
- To demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up small-scale enterprises.

Course Outcomes

COs	Course Outcomes	Blooms
		Level
CO1	Know the different components and chain link of sericulture industry.	Understand
CO2	Understand concepts of sericulture industry and demonstrate	Understand
	interdisciplinary skills	
	acquired in mulberry plant cultivation and silkworm rearing.	
CO3	Demonstrating the Laboratory and field skills in mulberry cultivation	Create
	and silkworm	
	rearing with an emphasis on technological aspects.	
CO4	To transfer the knowledge and technical skills to the Seri-farmers.	Understand
CO5	To analyze the environmental issues and apply in management of	Analyze
	mulberry garden and silkworm rearing at field.	
CO6	Demonstrate comprehensive innovations and skills in improvement of	Apply
	mulberry and	
	silkworm varieties for betterment of sericulture industry and human	
	welfare.	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							Μ			Μ		
CO2							Μ			Μ		
CO3							Μ			Μ		
CO4							Μ			Μ		
CO5							Μ			Μ		
CO6							Μ			Μ		

S-Strong; M-Medium; L-Low

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

UNIT - I

Introduction to Sericulture - History of Sericulture - Sericulture organization in India, By products of silk industry. Mulberry and Non - mulberry silkworm types-Morphology and Life cycle of Bombyxmori,

UNIT - II

Mulberry Cultivation: Mulberry Varieties - Methods of Irrigation - Nutrient Management and Weed control. Pruning and Harvesting – Crop improvement – Me chanism in Moriculture – Pest and Disease, deficiencies and symptoms in Mulberry.

$\mathbf{UNIT} - \mathbf{III}$

Rearing of silkworm – Rearing Appliances – rearing operation. Harvesting and marketing of cocoons. Cocoon processing and reeling - Appliances used for reeling. Pre reeling process - Cocoon boiling. Reeling technology – re-reeling technology.

UNIT - IV

Non – Mulberry Sericulture Scope of Non-mulberry Sericulture - Non-mulberry silk varieties and fauna, tasar, muga, eri – Silk Production and Marketing – Tropical tasar / muga – Morphology, anatomy grainage

$\mathbf{UNIT} - \mathbf{V}$

Diseases of silkworm -Pebrine Protozoan, Flacherie bacterial, Nuclear Poly hidrosis viral and Muscardine fungal diseases. Pests of Silkworm.

SUGGESTED READINGS

- Krisnamoorthy S., Improved Method of Rearing Young Age Silk Worms: Reprinted by CSB, 1. Bangalore, 1986.
- 2. Tanaka Y., Sericology, CSB, Pub., Bangalore, 1964.
- 3. Ullal S.R., and Narasimhan M.N., Hand Book of Practical Sericulture, CSB, Bangalore, 1987.
- 4. Hisao Aruga, Principles of sericulture, Oxford and IBH Publishing Company, 1994.
- 5. Hrccrama Reddy, G. 1998. Silkworm Breeding, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
- 6. Otsuki el.al. 1987. Silkworm Egg Production (Translated from Japanese Language), Oxford wild IBH Publishing Co. Pvt. Ltd., New Delhi.
- 7. Yasuji Hamamura, 2001 Silkworm Rearing on Artificial Diet (Translated from Japanese Language), Oxford wild IBH Publishing Co. Pvt. Ltd., New Delhi.
- Mahadevappa, D. Halliyal, V.G., Sankar, D.G and Bhandiwad, R. 2000. Mulberry Silk Reeling 8. Technology, Oxford wild IBH Publishing Co. Pvt. Ltd., New Delhi.
- 9. Dandin, S.B et.al. 2003. Advances in Tropical Sericulture, National Academy of Sericulture Sciences India, Central Silk Board, Bangalore, India.
- Ganga G., Sulochanachetty. J. An Introduction of Sericulture. Oxford, New Delhi 1977. 10.
- 11. Johnson M., and Kesary M., Sericulture, CSI Press, Marthandam, 2008.
- 12. Text Book of Tropical Sericulture, Pub., Japan Overseas Volunteers, 1975

(7 HOURS)

(7 HOURS)

(7 HOURS)

(8 HOURS)

SEMESTER-III CODING THEORY (THEORY)

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

- Elements of coding theory and its applications.
- Understand the concept of bounds in coding theory.
- About the encoding and decoding.
- Analyze the concept of cyclic coding
- Acquiring the knowledge special cyclic codes.

Course Outcomes

COs	Course Outcomes	Blooms Level
CO1	Recognize the basic concepts of coding theory.	Apply
CO2	Understand the importance of finite fields in the design of codes.	Understand
CO3	Detect and correct the errors occur in communication channels with the help of methods of coding theory.	Apply
CO4	Apply the tools of linear algebra to construct special type of codes.	Apply
CO5	Use algebraic techniques in designing efficient and reliable data transmission methods.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		S					Μ		Μ		
CO2	S		S					Μ		Μ		
CO3	S		S					Μ		Μ		
CO4	S		S					Μ		Μ		
CO5	S		S					Μ		Μ		
CO6	S		S					Μ		Μ		

S-Strong; M-Medium; L-Low

UNIT – I: ERROR DETECTION, CORRECTION AND DECODING (7 HOURS)

Communication channels – Maximum likelihood decoding – Hamming distance – Nearest neighbourhood minimum distance decoding – Distance of a code.

UNIT – II: LINEAR CODES

Linear codes – Self orthogonal codes – Self dual codes – Bases for linear codes – Generator matrix and parity check matrix – Enconding with a linear code – Decoding of linear codes – Syndrome decoding.

82
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UNIT - III: BOUNDS IN CODING THEORY

The main coding theory problem – lower bounds - Sphere covering bound – Gilbert Varshamov bound - Binary Hamming codes - q-ary Hamming codes - Golay codes - Singleton bound and MDS codes - Plotkin bound.

UNIT - IV: CYCLIC CODES

Definitions – Generator polynomials – Generator matrix and parity check matrix – Decoding of Cyclic codes.

UNIT - V: SPECIAL CYCLIC CODES

BCH codes - Parameters of BCH codes - Decoding of BCH codes - Reed Solomon codes.

SUGGESTED BOOKS

- 1. San Ling and Chaoping Xing (2004). Coding Theory: A first course, Cambridge University Press.
- 2. Lin. S & Costello. D. J. (1983). Jr., Error Control Coding: Fundamentals and Applications, Prentice-Hall, Inc., New Jersey.
- 3. Vera Pless (1982). Introduction to the Theory of Error Correcting Codes, Wiley, New York.
- 4. Berlekamp E.R. (1968). Algebriac Coding Theory, Mc Graw-Hill.
- 5. H. Hill (1986). A First Course in Coding Theory, OUP.

WEB LINKS

- 1. https://www.youtube.com/watch?v=XepXtl9YKwc
- 2. https://www.youtube.com/watch?v=oeQWxhlnCHM
- 3. https://www.youtube.com/watch?v=Z-QGtxlQWak

(8 HOURS)

(7 HOURS)

(7 HOURS)

SEMESTER-III INTERNSHIP **0H - 2C**

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

End Semester Exam: 3 Hours

0H - 15C

SEMESTER-IV PROJECT AND VIVA VOCE

Instruction Hours/week: L: 0 T: 0 P: 0 Marks: Internal: 80 External: 120 Total: 200 End Semester Exam: 3 Hours