

Dr. N.G.P.ARTS AND SCIENCE COLLEGE (Autonomous)

REGULATIONS 2019-20 for Under Graduate Programme (Outcome Based Education model with Choice Based Credit System)

B.Sc. Computer Science with Data Analytics

(For the students admitted during the academic year 2020-21 and onwards)

Programme: B.Sc. Computer Science with Data Analytics

Eligibility

A candidate who has passed in Higher Secondary Examination with Computer Science or Mathematics as one of the subjects under Higher Secondary Board of Examination and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Computer Science with Data Analytics Degree Examination** of this College after a programme of study of three academic years.

Programme Educational Objectives

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. To gain a substantial understanding of concepts in key areas Computer Science and its applications.
2. To carry out the required analysis and synthesis involved in Data Analytics and its applications.
3. To show professional competence in the IT industry and in its achievement.
4. To develop and equip the employability skills to meet the requirement of the Information Technology sector.
5. To prepare the students with adequate exposure and augment their data analytical skills.



PROGRAMME OUTCOMES:

On the successful completion of the program, the following are the expected outcomes.

PO Number	PO Statement
PO1	Ability to apply knowledge of Computer Science and Mathematics to identify problems and model solutions
PO2	Ability to analyze large data sets in the context of real world problems and interpret results
PO3	Ability to Design, Implement and Evaluate solutions for computing problems
PO4	Ability to apply current techniques, skills and tools necessary for Data Analytics
PO5	Ability to exhibit soft skills and understand professional and social responsibilities.



Guidelines for Programmes offering Part I& Part II for Two Semesters:


Part	Subjects	No.of Papers	Credit	Semester No.
I	Tamil / Hindi / French/Malayalam	4	4 x 3 = 12	I to IV
II	English	4	4 x 3 =12	I to IV
III	Core (Credits 2,3,4)	23	72	I to VI
	Inter Departmental Course (IDC)	4	16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course(SEC)	4	2 x 3=6 2 x 2=4	III ,IV
	Lab on Project (LoP)	1	1	III to V
IV	Environmental Studies(AECC)	1	2	I
	Value Education (VE) (Human Rights) (AECC)	1	2	II
V	Extension Activity NSS / Sports / Department Activity	-	1	I to VI
TOTAL CREDITS			140	



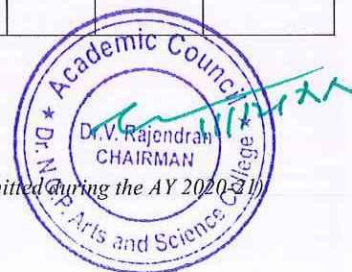
CURRICULUM

B.SC. COMPUTER SCIENCE WITH DATA ANALYTICS

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part – I										
191TL1A1TA	Language - I	Tamil-I	5	-	-	3	25	75	100	3
201TL1A1HA		Hindi-I								
201TL1A1MA		Malayalam-I								
201TL1A1FA		French – I								
Part – II										
191EL1A1EA	Language - II	English – I	5	-	-	3	25	75	100	3
Part – III										
194DA1A1CA	Core – I	Problem Solving and Programming in C	4	1	-	3	25	75	100	4
194DA1A1CP	Core Practical - I	C Programming	-	-	4	3	40	60	100	2
194DA1A1CQ	Core Practical - II	Analytics with Excel	-	-	4	3	40	60	100	2
202MT1A1ID	IDC – I	Probability Theory	4	1	-	3	25	75	100	4
Part – IV										
193MB1A1AA	AECC - I	Environmental Studies	2	-	-	3	-	50	50	2
Total			20	2	8				650	20


 BoS Chairman/HoD
 Department of Computer Science with Data Analytics
 Dr. N. G. P. Arts and Science College
 Coimbatore - 641 048
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B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part - I										
191TL1A2TA	Language - I	Tamil-II	4	-	-	3	25	75	100	3
201TL1A2HA		Hindi-II								
201TL1A2MA		Malayalam-II								
201TL1A2FA		French - II								
Part - II										
201EL1A2EA	Language - II	English - II	4	-	-	3	25	75	100	3
Part - III										
194DA1A2CA	Core - II	Data Science with Python	4	-	-	3	25	75	100	4
194DA1A2CB	Core - III	Data Structures and Algorithms	4	-	-	3	25	75	100	4
194DA1A2CP	Core Practical- III	Python Programming	-	-	4	3	40	60	100	2
194DA1A2CQ	Core Practical- IV	Data Structures	-	-	4	3	25	75	100	2
202PY1A2ID	IDC - II	Digital Logic and Circuits	4	-	-	3	25	75	100	4
Part - IV										
196BM1A2AA	AECC - II	Value Education - Human Rights	2	-	-	3	-	50	50	2
Total			22	-	8	-	-	-	750	24



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part - III										
194DA1A3CA	Core - IV	Computer Networks	5	-	-	3	25	75	100	4
194DA1A3CB	Core – V	Database Management Systems	5	-	-	3	25	75	100	4
194DA1A3CP	Core Practical - V	Database Management Systems	-	-	4	3	40	60	100	2
194DA1A3SA	SEC - I Theory	R Programming	3	1	-	3	25	75	100	4
194DA1A3SP	SEC - II Practical	R Programming	-	-	4	3	40	60	100	2
192MT1A3IF	IDC – III	Applied Statistics	4	-	-	3	25	75	100	4
	GE-I		2	-	-	2	-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A3AA	AECC - III	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A3AB		Advanced Tamil								
195CR1A3AA		Women’s Rights								
Total			21	1	8				700	24

GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective Course

Semester III (GE-I)

S. No.	Course Code	Course Name
1	194DA1A3GA	Introduction to Data Analytics

EXTRA CREDIT COURSES

The following are the courses offered under self study to earn extra credits:

S. No.	Course Code	Course Name
1	204DA1ASSA	Software Testing
2	204DA1ASSB	Decision Support Systems



Course Code	Course Category	Course Name	L	T	P	Ex am (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
Part - III										
194DA1A4CA	Core - VI	Java Programming	5	-	-	3	25	75	100	4
194DA1A4CB	Core -VII	Operating Systems	5	-	-	3	25	75	100	4
192MT1A4IF	IDC - IV	Discrete Mathematics	4	-	-	3	25	75	100	4
194DA1A4CP	Core Practical - VI	Java Programming	-	-	4	3	40	60	100	2
204DA1A4SA	SEC - III Theory	Data Mining	3	1	-	3	25	75	100	4
204DA1A4SP	SEC - IV Practical	Data Mining	-	-	4	3	40	60	100	2
	GE-II		2	-	-	3	-	100	100	2
	LoP		-	-	-	-	-	-	-	-
Part - IV										
191TL1A4AA	AECC - IV	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A4AB		Advanced Tamil								
192PY1A4AA		General Awareness								
Total			21	1	8	-	-	-	700	24

GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective Course
Semester IV (GE-II)

S. No.	Course Code	Course Name
1	194DA1A4GA	Introduction to Big Data



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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
Part - III										
194DA1A5CA	Core - VIII	Software Engineering	4	-	-	3	25	75	100	4
204DA1A5CB	Core - IX	Big Data Technologies	4	-	-	3	25	75	100	4
204DA1A5CA	Core - X	Artificial Intelligence	4	-	-	3	25	75	100	4
194DA1A5CD	Core -XI	Web Designing	4	-	-	3	25	75	100	4
204DA1A5CP	Core Practical-VII	Big Data Technologies	-	-	4	3	40	60	100	2
194DA1A5CQ	Core Practical-VIII	Web Designing	-	-	4	3	40	60	100	2
194DA1A5LA	LoP	Lab on Project	-	-	-	-	50	-	50	1
204DA1A5DA	DSE - I	Internet of Things	4	-	-	3	25	75	100	4
204DA1A5DB		Bio Informatics								
194DA1A5DC		Social Media Analytics								
Part - IV										
192MT1A5AA	AECC-V	Research Methodology	2	-	-	3	-	50	50	2
Total			22	-	8	-	-	-	800	27



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part - III										
204DA1A6CA	Core - XII	Machine Learning	5	-	-	3	25	75	100	4
194DA1A6CP	Core Practical -IX	Data Visualization	-	-	4	3	40	60	100	2
204DA1A6CV	Core - XIII	Project Work	-	-	9	3	40	60	100	4
194DA1A6 DA	DSE - II	Cloud Computing	5	-	-	3	25	75	100	4
204DA1A6DB		Web Analytics								
204DA1A6DC		Human Computer Interaction								
194DA1A6DD	DSE - III	Data Privacy and Security	5	-	-	3	25	75	100	4
194DA1A6DE		Natural Language Processing								
194DA1A6DF		Predictive Analytics								
Part-IV										
193BC1A6AA	AECC-VI	Innovation, IPR and Entrepreneurship	2	-	-	3	-	50	50	2
Part-V										
194DA1A6XA		Extension Activity	-	-	-	-	50	-	50	1
Total			17	-	13	-	-	-	600	21
Grand Total									4400	140



DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the listed elective course during Semesters V & VI

Semester V (Elective I)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	204DA1A5DA	Internet of Things
2.	204DA1A5DB	Bio Informatics
3.	194DA1A5DC	Social Media Analytics

Semester VI (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	194DA1A6DA	Cloud Computing
2.	204DA1A6DB	Web Analytics
3.	204DA1A6DC	Human Computer Interaction

Semester VI (Elective III) List of Elective Courses

S. No.	Course Code	Name of the Course
1.	194DA1A6DD	Data Privacy and Security
2.	194DA1A6DE	Natural Language Processing
3.	194DA1A6DF	Predictive Analytics



MOOC (NPTEL/SWAYAM/ SPOKEN TUTORIAL)

The following are the online courses offered:

Please refer the following link to select the courses

- www.swayam.org
- www.nptel.ac.in
- www.spoken-tutorial.org



REGULATION 2019-20

Effective from the academic year 2019-20 and applicable to the students admitted to the Degree of Bachelor of Science / Commerce/ Arts.

1. NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge are. Eg. Faculty of Computer Science consists of disciplines like Departments of Computer Science, Information Technology, Computer Technology and Computer Applications.

1.2 Programme: Refers to the Bachelor of Science / Commerce / Arts Stream that a student has chosen for study.

1.3 Batch: Refers to the starting and completion year of a programme of study. Eg. Batch of 2015–2018 refers to students belonging to a 3 year Degree programme admitted in 2015 and completing in 2018.

1.4 Course Refers to a component (a paper) of a programme. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work/ practical training / report writing / Viva voce, etc or a combination of these, to meet effectively the teaching and learning needs and the credits may be assigned suitably.

a) Core Courses

A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

b) Inter Disciplinary Course (IDC)

A course chosen generally from a related discipline/subject, with an intention to seek exposure in the discipline relating to the core domain of the student.

c) Discipline Specific Elective (DSE) Course: DSE courses are the courses offered by the respective disciplinary/ interdisciplinary programme.

d) Skill Enhancement Courses (SEC): SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

e) Ability Enhancement Courses (AEC): AECC courses are the courses based upon the content that leads to Knowledge enhancement. These



are mandatory for all disciplines. Environmental Science, Human Rights, Women's Rights, General Awareness, IPR and Innovation, Entrepreneurship Development and Research Methodology.

All these courses should be taught according to Outcome based Education.

1.5 Lab on Project (LoP)

To promote the undergraduate research among all the students, the LoP is introduced beyond their regular class hours. LoP is introduced as group project consisting of not more than five members. It consist of four stages namely Literature collection, Identification of Research area, Execution of research and Reporting / Publication of research reports/ product developments. These four stages spread over from III to V semester.

1.6 Project work

It is considered as a special course involving application of knowledge in problem solving / analyzing /exploring a real life situation / difficult problem. The Project work will be given in lieu of a Core paper.

Extra credits

Extra credits will be awarded to a student for achievements in co-curricular activities carried out outside the regular class hours. The guidelines for the award of extra credits are given in section- these credits are not mandatory for completing the programme.

Advanced Learner Course (ALC):

ALC is doing work of a higher standard than usual for students at that stage in their education. Research work carried out in University/ Research Institutions/ Industries of repute in India or abroad for a period of 15 to 30 days will be considered as Advanced Learners Course.



2. STRUCTURE OF PROGRAMME

2.1 PART – I: LANGUAGE

Tamil or any one of the languages namely Malayalam, Hindi and French will be offered under Part – I in the first two / four semesters.

2.2 PART – II : ENGLISH

English will be offered during the first two / four semester.

2.3 PART – III :

- Core course
- Inter Departmental Course (IDC)
- Discipline Specific Elective (DSE)
- Skill Enhancement Course (SEC)
- Generic Elective (GE)
- Lab on Project (LoP)
- Industrial Training (IT)

2.4 PART IV

2.4.1 Ability Enhancement Compulsory Course

The ability enhancement courses such as i) Environmental Studies, ii) Human Rights, iii) Womens' Rights, iv) General Awareness, v) Research Methodology, vi) Intellectual Property Rights(IPR), Innovation and Entrepreneurship or IPR and Innovation from I to VI Semester.

a) Those who have not studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take Tamil comprising of two courses.

(OR)

b) Those who have studied Tamil up to XII std and taken a non-Tamil language under Part-I shall take Advanced Tamil comprising of two courses in the third and fourth semesters.

(OR)

c) Students who come under the above a+b categories are exempted from Women's Rights and General awareness during III and IV semester respectively.



2.5 PART V: EXTENSION ACTIVITIES

The following co-curricular and extracurricular activities are offered under institutional / department Association/ club/ extension programmes for the students under extension activities from I to IV semester.

a) Institutional

- National Service Scheme (NSS)
Participation in any one of the camps organized by NSS unit.
- Friends of Police(FoP)
Active participation in traffic regulation and other extension activities
- Sports
Active participation in any one of the sports activities
- Youth Red Cross (YRC)
Active participation in YRC programmes

b) Department Association

Membership and active participation in the department association activities.

c) Clubs

Membership and active participation in any one club activities.

1. CREDIT ALLOTTMENT

The following is the credit allotment:

- Lecture Hours (Theory) : Max.1 credit per lecture hour per week,
1 credit per tutorial hour per week
- Laboratory Hours : 1 credit for 2 Practical hours per week.
- Project Work : 1 credit for 2 hours of project work per week

2. DURATION OF THE PROGRAMME

A student is normally expected to complete the B.Sc. /B.com. /BA Programme in 6 semesters. However, in any case not more than 7 consecutive semesters. Failing which the concern BoS will identify suitable / equivalent course.



3. REQUIREMENTS FOR COMPLETION OF A SEMESTER

Candidate shall be permitted to appear for the End Semester examinations for any semester (practical/theory) if

- i) He/she secures not less than 75% of attendance in the number of working days during the semester.
- ii) He/she earns a progress certificate from the Head of the institution, of having satisfactorily completed the course of study prescribed in the scheme of examinations for that semester as required by these regulations, and
- iii) His/her conduct / character is satisfactory.
 - Provided that it shall be open to the Academic council, or any authority delegated with such powers by the Academic council, to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed, for valid reasons, subject to usual conditions. (Refer the Ordinance No.1 of 1990 of the Bharathiar University)
 - A candidate who earned 75% of attendance and more in the current semester are eligible to write the examination in current semester subjects.
 - A candidate who has secured less than 65% but 55% and above attendance in any semester has to compensate the shortage in attendance in the subsequent semester besides earning the required percentage of attendance in that semester and appear for both semester papers together at the end of the later semester.
 - A candidate who has secured less than 55% of attendance in any semester shall not be permitted to appear for the regular examinations and to continue the study in the subsequent semester. He/she has to rejoin the semester in which the attendance is less than 55%.
 - A candidate who has secured less than 65% of attendance in the final semester has to compensate his/her attendance shortage in a manner as decided by the concerned Head of the department after rejoining the same course.



4. EXAMINATIONS

- The end semester examinations shall normally be conducted after completing 90 working days for each semester.
- The maximum marks for each theory and practical course (including the project work and Viva-Voce examination in the final Semester) shall be 100 with the following breakup.

(i) Theory Courses

Continuous Internal Assessment (CIA) : 25 Marks

End Semester Exams (ESE) : 75 Marks

(ii) For Practical/ Courses

Continuous Internal Assessment (CIA) : 40 Marks

End Semester Exams (ESE) : 60 Marks

- a. The following are the distribution of marks for the Continuous Internal Assessment in Practical, Project / Industrial Training Courses.

Continuous Internal Assessment for Practical Courses:

S.No	For - UG practical courses	Distribution of Marks					
1	Minimum 10 experiments to be conducted/practical paper/semester	20	15	10	8	5	4
2	Tests : Two tests out of which one shall be during the mid semester and the other to be conducted as model test at the end of the semester.)	16	10	10	8	6	6
3	Observation Note Book	4	5	5	4	4	-
	TOTAL MARKS	40	30	25	20	15	10



Project viva-voce / Industrial Training

The following are the distribution of marks for the continuous Internal assessment in UG Project/Industrial Training courses.

S.no	For - UG Project courses//Industrial Training	Distribution of Marks	
1	Review-I	5	10
2	Review-II	5	10
3	Review-III	5	10
4	Document, Preparation and Implementation	10	10
	TOTAL MARKS	25	40

b. Following are the distribution of marks for the External Examination in UG Project /Industrial Training courses

S.no	For - UG Project //Industrial Training courses	Distribution of Marks	
1	Record Work and Presentation	35	40
2	Viva-Voce	15	20
	TOTAL MARKS	50	60

Part – IV

The courses offered under Part – IV shall have only End Semester Examinations (ESE) for a maximum of 50 Marks. However, Students who select “Tamil” under Part IV, will be assessed only by Continuous Internal Assessment (CIA). The marks shall be furnished to the COE by the concerned Course teacher through the Head of the Department.



6.1 CONTINUOUS ASSESSMENT EXAMS

6.1 Theory courses

a) Continuous Internal Assessment test (CIA)

There will be a Minimum of two Continuous Assessment Exams, for each Theory course. The first and Second Assessment Exams will be conducted for a Maximum of 50 Marks and 75 marks respectively. The total marks secured in the Two Assessment Exams will be converted to 15 Marks.

b) Utilization of Library

Marks will be awarded to the student based on the hours spent in the library after the working hours and submission of report by the student.

Hours spent in Library	Marks	Type of Document submitted
2	1	Report/ Assignment/ Class presentation
4	2	
6	3	
8	4	
10	5	
12	6	

- During the Library hour, the student must spend time in reading the articles, books, journals of their subject of interest
- Each student should borrow minimum three books during the semester
- Student is expected to submit one Report / Assignment / Class Presentation per Course.

c) Class Participation

Active participation in classroom discussion by the student will be evaluated based on Integration of knowledge, Interaction and Participation and demonstration of knowledge.



d) Papers / Reports/ Assignments/ Class Presentation

The student will be evaluated based on his ability to do analysis of application of theory to real world problems or creative extension of class room learning and his/her ability to communicate the given topic effectively and clearly.

Continuous Assessment OBE Rubrics Score Sheet

Degree: _____ Branch: _____ Semester: _____

Course Code: _____ Course: _____

Max. Marks: _____ Internal: _____ External: _____ Total: _____

S.No.	REG. NO	THEORY / PRACTICAL & LIBRARY CLASS PARTICIPATION (15) (Compulsory)				RUBRICS ASSESSMENT (SELECT ANY ONE)								Total Marks out of : 30	Total Marks out of : 16 / 10 / 08 / 04	
						PAPERS / REPORTS (15)				ASSIGNMENTS (15)		CLASS PRESENTATION (15)				
		Library	Integration of Knowledge	Interaction & Participation	Demonstration of Knowledge	Organization & Knowledge	Format & Spelling	Reference / Experiments	Demonstration of Knowledge	Format & Spelling	Reference	Content & Coherence	Creativity and Speaking Skills			Duration of Presentation
1		6	3	3	3	5	5	5	5	5	5	5	5	5		



The following are the distribution of marks for the continuous internal assessment in UG practical courses

S.No	For - UG Practical Courses	Distribution of Marks					
1	Minimum 10 experiments to be conducted/practical paper/semester	20	15	10	8	5	4
2	Tests : Two tests out of which one shall be during the mid semester and the other to be conducted as model test at the end of the semester.)	16	10	10	8	6	6
3	Observation Note Book	4	5	5	4	4	-
	TOTAL MARKS	40	30	25	20	15	10



7. FOR PROGRAMME COMPLETION

Programme Completion (for students admitted in the A.Y.2019-20 and Onwards)

Student has to complete the following:

- i) Part I, II,III,IV,V as mentioned in the scheme
- ii) Industrial/ Institutional training

Students must undertake industrial / institutional training for a minimum of 15 days and not exceeding 30 days during the IV semester summer vacation. The students will submit the report for evaluation during V semester.

Based on the performance Grade will be awarded as follows:

Marks Scored	Grade to be awarded
75 and above	A
60-74	B
40-59	C
< 40	Re-Appearence

- iii) Skill Enhancement Training

Student must undergo Skill Enhancement training on Communication skills (I and II Semester) and Quantitative aptitude (III and IV Semester) respectively each for 40 h.



8. EXTRA CREDITS

- Earning extra credit is mandatory. However, it is not essential for programme completion
- Extra Credits will be awarded to a student for achievement in co-curricular/ extracurricular activities carried other than the regular class-hours.
- The detailed guidelines for the award of extra credits are as follows:
- A student is permitted to earn a maximum of five extra Credits during the programme duration of UG from I to V Semester.
- Candidate can claim a maximum of 1 credit under each category listed.

The following are the guidelines for the award of Extra credits:

8.1 Proficiency in foreign language

Qualification	Credit
A pass in any foreign language in the examination conducted by an authorized agency	1

8.2 Proficiency in Hindi

Qualification	Credit
A pass in the Hindi examination conducted by Dakshin Bharat Hindi Prachar Sabha	1

Examination passed during the programme period only will be considered for extra credit

8.3 Self-study Course

Qualification	Credit
A pass in the self-study courses offered by the department	1

The candidate should register the self-study course offered by the department only in the III semester



8.4 Typewriting/Short hand

A Pass in short hand / typewriting examination conducted by Tamil Nadu Department of Technical Education (TNDTE) and the credit will be awarded.

Qualification	Credit
A pass in the type writing / short hand examination offered by TNDTE	1

8.5 Diploma / Certificate

Courses offered by any recognized University / NCVRT

Qualification	Credit
A pass in any Certificate course/ Diploma / PG Diploma	1

8.6 CA/ICSI/CMA

Qualification	Credit
Qualifying foundation / Inter level / Final in CA/ICSI/CMA / etc.,	1

8.7 Sports and Games

The Student can earn extra credit based on their Achievement in sports as given below:

Qualification	Credits
Achievement in University/ State / National/ International	1

8.8 Online Courses

Pass in any one of the online courses

Qualification	Credit
SWAYAM/NPTEL/Spoken Tutorial etc.,	1



8.9 Publications / Conference Presentations (Oral/Poster)/Awards

Qualification	Credit
Research Publications in Journals/ oral/poster presentation in Conference	1

8.10 Innovation / Incubation / Patent / Sponsored Projects / Consultancy

Qualification	Credit
Development of model/ Products /Prototype /Process/ App/Registration of Patents/ Copyrights/Trademarks/Sponsored Projects /Consultancy	1

8.11 Representation

Qualification	Credit
State / National level celebrations such as Independence day, Republic day Parade, National Integration camp etc.,	1



Course Code	Course Name	Category	L	T	P	Credit
191TL1A1TA	தமிழ்த் தாள் - I	மொழி- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு , பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத்திறன்கள் (Life Skills) – மாணவனின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1,K2,K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2,K4
CO3	பாட இணைச் செயல்பாடுகள் (Co-curricular activities)	K2,K3,K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5, K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	M	M	M	M
CO3	S	M	M	M	M
CO4	S	M	M	M	M
CO5	S	M	M	M	M

S Strong

M Medium

L Low



Dr.NGPASC

COIMBATORE | INDIA

B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

191TL1A1TA	தமிழ்த்தாள் - I	SEMESTER I
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Total Credits: 03

Total Instruction Hours: 60 h

Syllabus

Unit I மறுமலர்ச்சிக் கவிதைகள் 12 h

1. உயிர் பெற்ற தமிழர் பாட்டு - பாரதியார்
2. படி - பாரதிதாசன்
3. போராடப் புறப்பட்டோம் - தமிழ் ஒளி
4. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
5. திரைத்தமிழ்
 - அ) சும்மா கிடந்த நிலத்தை எனத்தொடங்கும் பாடல் -
 - பட்டுக்கோட்டை கல்யாண சுந்தரனார்
 - ஆ) சமரசம் உலாவும் இடமும் எனத்தொடங்கும் பாடல் - மருதகாசி
 - இ) உன்னை அறிந்தால் எனத்தொடங்கும் பாடல் - கண்ணதாசன்

Unit II புதுக்கவிதைகள் 12 h

1. கடமையைச் செய் - மீரா
2. அம்மாவின் பொய்கள் - ஞானக்கூத்தன்
3. செருப்புடன் ஒரு பேட்டி - மு.மேத்தா
4. ஒரு சிங்கவால் குரங்கின் மரணம் - சிற்பி
5. கடல்கோள் 2004 - முத்தமிழ் விரும்பி
6. கரிக்கிறது தாய்ப்பால் - ஆரூர் தமிழ்நாடன்
7. பள்ளி - நா. முத்துக்குமார்
8. ஹைகூ கவிதைகள் - 15 கவிதைகள்

Unit III பெண்ணியம் 08 h

1. ஒரு கதவும் கொஞ்சம் கள்ளிப்பாலும் - தாமரை
2. நீரில் அலையும் முகம் - அ. வெண்ணிலா
3. தொட்டிச் செடி - இளம்பிறை
4. ஏனிந்த வித்தியாசங்கள் - மல்லிகா



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B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

Unit IV சிறுகதைகள்

15 h

- | | |
|------------------------|--------------------|
| 1. வேப்பமரம் | - ந. பிச்சமூர்த்தி |
| 2. அகல்யை | - புதுமைப்பித்தன் |
| 3. ஒருபிடி சோறு | - ஜெயகாந்தன் |
| 4. காய்ச்சமரம் | - கி. ராஜநாராயணன் |
| 5. நிராசை | - பாமா |
| 6. எருமை சீமாட்டி | - பெருமாள் முருகன் |
| 7. குதிரை மசால் தாத்தா | - சு. வேணுகோபால் |

Unit V இலக்கியவரலாறு, இலக்கணம் மற்றும் பயிற்சிப் பகுதி

13 h

அ. இலக்கிய வரலாறு

1. மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள்
2. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
3. சிறுகதையின் தோற்றமும் வளர்ச்சியும்

ஆ. இலக்கணம்

1. வல்லினம் மிகும், மிகா இடங்கள் (ஒற்றுப்பிழை நீக்கி எழுதுதல்)
2. ர,ற ,ல, ழ, ள ,ண, ந,ன, வேறுபாடு (ஒலிப்பு நெறி, சொற்பொருள் வேறுபாடு அறிதல்)

இ. படைப்பாக்கப் பயிற்சி

1. கவிதை, சிறுகதை எழுதுதல்

Text Books

- 1 செய்யுள் மற்றும் உரைநடைத் திரட்டு . 2019. தொகுப்பு : தமிழ்த் துறை , டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி. நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை.

References

- 1 பேராசிரியர் முனைவர் பாக்கியமேரி. இலக்கணம் இலக்கிய வரலாறு மொழித்திறன். முதல் பதிப்பு 2013 . பூவேந்தன் பதிப்பகம். சென்னை
- 2 தமிழண்ணல் . புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு . பதினாறாம் பதிப்பு 2000 மீனாட்சி புத்தக நிலையம். மதுரை.
- 3 பேராசிரியர் புலவர் இளவரசு ,சோம. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு. எட்டாம் பதிப்பு ஜூலை 2012.மணிவாசகர் பதிப்பகம்.சென்னை
- 4 தமிழ் இணையக் கல்விக்கழகம். <<http://www.tamilvu.org/>>



Course Code	Course Name	Category	L	T	P	Credit
201TL1A1HA	HINDI-I	Language 1	4	1	-	03

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill.
- various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process.

communicate Hindi

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories.	K1
CO2	Understand the principles of translation work.	K2
CO3	Apply the knowledge writing critical views on fiction.	K3
CO4	Build creative ability.	K3
CO5	Expose the power of creative reading.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong

M Medium

L Low



201TL1A1HA	HINDI-I	SEMESTER I
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Total Credits: 03

Total Instruction Hours: 60 h

Syllabus

Unit I	गद्य – नूतन गद्य संग्रह (जय प्रकाश)	12 h
	पाठ 1- रजिया	
	पाठ 2- मक्रील	
	पाठ 3- बहता पानी निर्मला	
	पाठ 4- राष्ट्रपिता महात्मा गाँधी	
Unit II	कहानी कुंज- डॉ वी.पी. 'अमिताभ'	12 h
	कहानी कुंज- डॉ वी.पी. 'अमिताभ' (पाठ 1-4)	
Unit III	व्याकरण	12 h
	शब्द विचार (संज्ञा, सर्वनाम, कारक, विशेषण)	
Unit IV	अनुच्छेद लेखन	12 h
	अनुच्छेद लेखन	
Unit V	अनुवाद	12 h
	अभ्यास-III (केवल अंग्रेजी से हिन्दी में)	

Text Books

- 1 प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्टमेंट्स, 15 हेस्टिंग्स रोड' अशोक नगर
इलाहाबाद-211001 (Unit - I)
- 2 प्रकाशक: गोविन्द प्रकाशन सदर बाजार, मथुरा उत्तर प्रदेश – 281001 (Unit-II)
- 3 पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद –
211024 (Unit-III)
- 4 पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024 (Unit-IV)
- 5 (पाठ 1 to 10) प्रकाशक: दक्षिण भारत प्रचार सभा चेन्नई -17 (Unit - V)



Course Code	Course Name	Category	L	T	P	Credit
201TL1A1MA	MALAYALAM	Language - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- develop the writing ability and develop reading skill.
- various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories.	K1
CO2	Understand the principles of translation work.	K2
CO3	Apply the knowledge writing critical views on fiction	K3
CO4	Build creative ability.	K3
CO5	Expose the power of creative reading.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong

M Medium

L Low



201TL1A1MA	MALAYALAM - I	SEMESTER I
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I	Novel	12 h
	1. Alahayude penmakkal	
Unit II	Novel	12 h
	1. Alahayude penmakkal	
Unit III	Short Story	14 h
	2. Nalinakanthi	
Unit IV	Short Story	10 h
	2. Nalinakanthi	
Unit V		12 h
	Composition & Translation	

Text Books

- 1 Alahayude penmakkal (NOVEL) By Sara Joseph Published by Current books Thrissur.
- 2 Nalinakanthi (Short story) By T.Padmanabhan Published by DC.Books Kottayam
- 3 Expansion of ideas, General Essay And Translation.

References

- 1 Malayala Novel Sahithyam
- 2 Malayala cherukatha Innale Innu.



Course Code	Course Name	Category	L	T	P	Credit
201TL1A1FA	FRENCH- I	Language - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Competence in General Communication Skills - Oral + Written - Comprehension & Expression.
- the Culture, life style and the civilization aspects of the French people as well as of France.
- Competency in translating simple French sentences into English and vice versa.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents.	K1
CO2	learn the adjectives and the classroom environment in France.	K2
CO3	Learn the Plural, Articles and the Hobbies.	K3
CO4	learn the Cultural Activity in France.	K3
CO5	learn the Sentiments, life style of the French people and the usage of the conditional tense.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong

M Medium

L Low



201TL1A1FA	FRENCH- I	SEMESTER I
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Salut I Page 10

12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
<ul style="list-style-type: none"> • Saluer • Enter en contact avec quelqu'un. • Se présenter. • S'excuser 	En cours de cuisine, premiers contacts avec les membres d'un groupe	<ul style="list-style-type: none"> • Comprendre des personnes qui se saluent. • Échanger pour entrer en contact, se présenter, saluer, s'excuser. • Communiquer avec <i>tu</i> ou <i>vous</i>. • Comprendre les consignes de classe • Épeler son nom et son prénom. <p>Computer jusqu'à 10.</p>

Unit II Enchanté I Page 20

12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
<ul style="list-style-type: none"> • Demander de se présenter. • Présenter quelqu'un. 	Dans la classe de français, se présenter et remplir une fiche pour le professeur.	<ul style="list-style-type: none"> • Comprendre les informations essentielles dans un échange en milieu professionnel. • Échanger pour se présenter et présenter quelqu'un.

Unit III J'adore I Page 30

12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
<ul style="list-style-type: none"> • Exprimer ses goûts. 	Dans un café, participer à une soirée de rencontres	<ul style="list-style-type: none"> • Dans une soirée de rencontres rapid comprendre des personnes qui échantent sur elles et sur leurs goût • Comprendre une personne



	rapides et remplir de tâches d'appréciation.	qui parler des goûts de quelqu'un d'autre.
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Unit IV J'adore I Page 30

14 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
<ul style="list-style-type: none"> Présenter quelqu'un 	Dans un café, participer à une soirée de rencontres rapides et remplir de tâches d'appréciation	<ul style="list-style-type: none"> Exprimer ses goûts. Comprendre une demande laissée sur un répondeur téléphonique. Parler de ses projets de week-end.
Autoévaluation du module I Page 40 – Préparation au DELF A1 page 42		

Unit V Tu veux bien? Page 46

10 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
<ul style="list-style-type: none"> Demander à quelqu'un de faire quelque chose. Demander poliment. Parler d'actions passées. 	Organiser un programme d'activités pour accueillir une personne importante.	<ul style="list-style-type: none"> Comprendre une personne demande un service à quelqu'un. Demander à quelqu'un de faire quelque chose. Imaginer et raconter au passé à partir de situations dessinées.

Text Books

- 1 Regine Merieux, Yves Loiseau, LATITUDES 1(Methode de Français), Goyal Publisher & Distributors Pvt.Ltd., 86 UB Jawahar Nagar (Kamala Nagar),Delhi-7 Les Editions Dider, Paris,2008- Imprime en Roumanie par Canale en Janvier 2012.



Course Code	Course Name	Category	L	T	P	Credit
191EL1A1EA	ENGLISH - I	Language - II	4	0	1	3

PREAMBLE

This course has been designed for students to learn and understand

- To experience the effect of dialogue, the brilliance of imagery and the magnificence of varied genre
- To strengthen the student's English vocabulary and understanding of English sentence structure
- To communicate effectively and acquire knowledge on the transactional concept of English language

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Extend interest in and appreciation of the works of eminent writers from various literatures	K2
CO2	Interpret the genres in literature through the master works of great visionaries	K3
CO3	Perceive the language gaps through a clear model of the grammatical structure	K5
CO4	Analyze the concepts of texts in the course of different lessons which are realistic and discursive in nature	K4
CO5	Value the integral concepts of English grammar necessarily required in their linguistic competence	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	S	S
CO3	M	S	S	S	M
CO4	S	S	M	S	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



191EL1A1EA	ENGLISH - I	SEMESTER I
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies - I 10 h

The Road Not Taken – Robert Frost

All the World's a Stage – William Shakespeare

Whitewashing the Fence – Mark Twain

The Face of Judas Iscariot - Bonnie Chamberlain

Soul Gone Home – Langston Hughes

Unit II Genre Studies - II 11 h

Ode on a Grecian Urn – John Keats

Mending Wall – Robert Frost

My Early Days – Dr. A.P.J. Abdul Kalam

Nightfall – Isaac Asimov

A Kind of Justice – Margret Atwood

Unit III Grammar - I 14 h

Parts of Speech

Articles and Prepositions

Subject Verb Agreement

Degrees of Comparison

Sequence of Tenses

Unit IV Genre Studies - III 11 h

On his Blindness - John Milton

Small - Scale Reflections on a Great House – A.K. Ramanujan

On Prayer – Khalil Gibran

The Garden Party – Katherine Mansfield

The Tell - Tale Heart – Edgar Allen Poe



Unit V Grammar - II

14 h

If Conditionals

Modal Auxiliary Verbs

Question Types/Tags

Voice

Direct and Indirect Speech

Text Books

- 1 Prabha, Vithya. R and S. Nithya Devi. 2019. Sparkle: English Textbook for First Year. McGraw Hill Education, Chennai.
- 2 Wren and Martin. 2006. High School English Grammar and Composition. S. Chand Publishing, New Delhi.

References

- 1 Bajwa and Kaushik. 2010. Springboard to Success- Workbook for Developing English and Employability Skills. Orient Black Swan, Chennai
- 2 Syamala. V. 2002. Effective English Communication for You. Emerald Publishers, Chennai.
- 3 Krishnaswamy. N, Lalitha Krishnaswamy & B.S. Valke. 2015. Eco English, Learning English through Environment Issues. An Integrated, Interactive Anthology. Bloomsbury Publications, New Delhi.
- 4 Krishnaswamy. N. 2000. Modern English: A Book of Grammar, Usage And Composition. Macmillan, New Delhi.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A1CA	PROBLEM SOLVING AND PROGRAMMING IN C	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of Problem Solving
- The significant features of C language
- How to apply C language for developing applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Able to design a computational solution for a given problem	K1
CO2	Apply the knowledge of arrays	K2
CO3	Analyze the given problem statement, divide it into modules and represent them using functions in C	K3
CO4	Identify the role of structure, union and pointers and use the suitable data type to store and manipulate data in C	K3
CO5	Develop a C program for a files by using the necessary program structure, data types and constructs	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	L
CO2	S	M	S	M	L
CO3	S	S	S	M	M
CO4	S	M	S	M	M
CO5	S	S	S	S	S
S	Strong	M	Medium	L	Low



194DA1A1CA	PROBLEM SOLVING AND PROGRAMMING IN C	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Problem Solving and Introduction to C 10 h

Introduction to Problem Solving - Program development - Analyzing and Defining the Problem - Algorithm - Flow Chart - Introduction to C Programming - Character Set - Tokens - Operators and Expressions - Formatted Input and Output Functions

Unit II Control Structures and Arrays 12 h

Introduction: Control Statements - If and Switch statements - While Statement - Do While Statement - Switch - For Loop - Nested Loop - Break - Continue - Go to Statement Defining Array - One dimensional - Two dimensional - Multi dimensional array

Unit III Strings and Functions 12 h

Defining a string - Initialization of Strings - Reading and Writing Strings - String Functions - Defining a function - Accessing a function - Function prototypes - Passing arguments to a function - Passing arrays to functions - Recursion - Storage classes

Unit IV Pointers and Structures 14 h

Features of Pointers - Pointer Declaration - Arithmetic Operation with Pointers - Pointers and arrays - Pointers and Two-Dimensional arrays - Array of Pointers - Structures and Unions: Defining a Structure - Processing a Structure - Array of Structures - Structure within Structure - Pointers to Structures - Enumerated Data Type - Union

Unit V Files 12 h

Introduction: Stream and File Types - Steps for File operations - File Input/Output - Error Handling in Input/Output Operations - Structures Read and Write - Other File Function - Command Line Arguments - Dynamic Memory Allocation - malloc() - calloc() - free() - realloc()



Text Books

- 1 Ashok N. Kamthane, (2007), "Computer programming", (1st Edn.), Pearson Education.
- 2 Deitel H. M. and Deitel P. J, (2012), "C How to Program", (6th Edn.), Prentice Hall.

References

- 1 Brian W. Kernighan and Dennis M. Ritchie, (2006), "The C programming Language", (2nd Edn.), Prentice- Hall.
- 2 Byron S Gottfried, (2006), "Programming with C", Schaums Outlines, (2nd Edn.), Tata McGraw-Hill.
- 3 Pradip Dey, Manas Ghosh, (2013), "Computer Fundamentals and Programming in C", (2nd Edn), Oxford University Press.



194DA1A1CP	CORE PRACTICAL: C PROGRAMMING	SEMESTER I
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Total Credits: 2

Total Instructions Hours: 48 h

S.No	List of Experiments
1	Simple programs to understand the concepts of data types
2	Programs to get familiarity on using conditional statements
3	Programs to perform control and repetition statements
4	Program to Perform Matrix operations
5	Program to Work with pointers
6	Program to implement functions
7	Program to perform Functions (call by value and call by reference)
8	Program to create and implement String manipulations
9	Program to test dynamic Memory Allocations
10	Program to implement structures
11	Program to perform union and enumerated Data types
12	Application Program using File operations

Note: Ten Programs are Mandatory



194DA1A1CQ	CORE PRACTICAL:ANALYTICS WITH EXCEL	SEMESTER I
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Total Credits: 2

Total Instructions Hours: 48 h

S.No	List of Experiments
1	Program using the formulas and Functions
2	Simple frequencies with charts: Column Chart, Line Chart, Pie Chart, Bar Chart, Area Chart, Scatter Chart
3	Program Using sort and filter
4	Program to create a What-If Analysis
5	Program to perform Means and Standard deviation using pivot tables
6	Program to create Macros in Excel
7	Program to implement analysis Toolpak(Histogram,Anova,T Test,F Test)
8	Program to perform Solver by using Excel
9	Program for String Manipulation in Excel VBA
10	Comparative Data Analysis using Excel VBA
11	Trend Analysis using Excel VBA
12	Using pivot tables to analyze twitter data

Note: Ten Programs are Mandatory



Course Code	Course Name	Category	L	T	P	Credit
202MT1A1ID	PROBABILITY THEORY	IDC	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Basic concepts of Probability theory
- Concepts of Correlation and Regression
- Idea of Exponential and Geometric curves

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the basic concepts and methods of probability theory	K1
CO2	Apply the knowledge of probability distributions	K2
CO3	Analyze and apply the properties of correlations	K3
CO4	Examine the Regression coefficients	K3
CO5	Demonstrate the concept of Curve Fitting and Principle of Least Squares	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	S
CO2	L	S	S	M	S
CO3	L	M	S	M	M
CO4	M	S	M	S	S
CO5	M	S	M	S	S

S Strong M Medium L Low



202MT1A1ID	PROBABILITY THEORY	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Theory of Probability 14 h

Random Experiment- Outcome- Event - Important Terminology - Techniques of counting - Classical definition of probability - Theorems of probability - Drawing without replacement - Repeated trials - Drawing without replacement - Baye's theorem- Mathematical Expectation-Conditional probability- Independent events

Unit II Theoretical Distributions 12 h

Random variable and probability distribution- Discrete probability distribution - Expectations - Mean - Variance - Moments - Uniform distribution - Binomial distribution - Poisson distribution - Joint distribution of two variables - Continuous probability distribution - Uniform distribution - Central limit theorem

Unit III Correlation 12 h

Concepts of correlation - Bivariate data - Bivariate frequency Distribution - Scatter Diagram - Correlation - Covariance - Correlation Coefficient - Properties of correlation coefficient - Calculation of r - Interpretations and use of r - Variance of the sum of two series

Unit IV Regression 10 h

Regression- Properties of Linear regression - Explained variation and unexplained variation - Regression curve in bivariate frequency distribution - Rank correlation - Multiple and Partial correlation

Unit V Curve Fitting and Method of Least Squares 12 h

Introduction: Curve fitting - Fitting of straight line - Fitting of second degree Parabola - Free hand method of curve fitting - Method of least squares - Simplified calculations - Fitting of exponential and geometric curves

Note: Theory 20% and Problem 80%



Text Book

- 1 Das, N.G, 2017, "Statistical Methods Combined Edition (Volume I and Volume II", 16th Edition, Tata McGraw Hill Education, New Delhi

References

- 1 Pillai Bagavathy, R.S.N, 2016, "Statistics Theory and Practice", 14th Edition, Sultan Chand and Sons, New Delhi
- 2 Sheldon Ross, 2017, "A First Course in Probability", 5th Edn, Prentice Hall, New Jersey
- 3 Gupta, S.P, 2017, "Statistical Methods", 16th Edition, Sultan Chand and Sons, New Delhi
- 4 Sheldon M.Ross, 2017, "Introductory Statistics", 4th Edition, Academic Press, New Jersey



Course Code	Course Name	Category	L	T	P	Credit
193MB1A1AA	VALUE EDUCATION- ENVIRONMENTAL STUDIES	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- Multi disciplinary aspects of Environmental studies
- Importance to conserve the Biodiversity
- Causes of Pollution and its control

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	understand the importance of natural resources in order to conserve for the future.	K2
CO2	inculcate the knowledge on structure, function and energy flow in the Eco system.	K3
CO3	impart knowledge on Biodiversity and its conservation.	K3
CO4	create awareness on effects, causes and control of air, water, soil and noise pollution etc.	K2,K3
CO5	build awareness about sustainable development and Environmental protection	K2,K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	M	M	M	M
CO3	M	M	M	M	M
CO4	M	M	M	M	M
CO5	M	M	M	M	M

S Strong

M Medium

L Low



193MB1A1AA	VALUE EDUCATION- ENVIRONMENTAL STUDIES	SEMESTER I
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Environmental studies& Ecosystems 4 h

Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development. What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit II Natural Resources: Renewable and Non-renewable Resources 5 h

Land Resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and overexploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Heating of earth and circulation of air; air mass formation and precipitation. Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit III Biodiversity and Conservation 5 h

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit IV Environmental Pollution, Environmental Policies & Practices 5 h

Environmental pollution : types, causes, effects and controls; Air, water, soil, chemical and noise pollution. Nuclear hazards and human health risks. Solid waste management: Control measures of urban and industrial waste. Pollution case studies. Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Environment Laws : Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and



control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC). Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context.

Unit V Human Communities and the Environment & Field Work 5 h

Human population and growth: Impacts on environment, human health and welfares. Carbon foot-print. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquakes, cyclones and landslides. Environmental movements: Chipko, Silent valley, Bishnios of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). Visit to an area to document environmental assets; river/forest/flora/fauna, etc. Visit to a local polluted site – Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds and basic principles of identification. Study of simple ecosystems-pond, river, Delhi Ridge, etc.

Text Books

- 1 Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt
- 2 Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
- 3 Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
- 4 Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- 5 Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
- 6 Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
- 7 McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 2964). Zed Books.
- 8 McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
- 9 Odum, E.P., Odum, h.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.



References

- 1 Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
- 2 Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
- 3 Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
- 4 Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part - I										
191TL1A2TA	Language - I	Tamil-II	4	-	-	3	25	75	100	3
201TL1A2HA		Hindi-II								
201TL1A2MA		Malayalam-II								
201TL1A2FA		French – II								
Part - II										
201EL1A2EA	Language - II	English – II	4	-	-	3	25	75	100	3
Part – III										
194DA1A2CA	Core – II	Data Science with Python	4	1	-	3	25	75	100	4
194DA1A2CB	Core – III	Data Structures and Algorithms	4	-	-	3	25	75	100	4
194DA1A2CP	Core Practical- III	Python Programming	-	-	3	3	40	60	100	2
194DA1A2CQ	Core Practical- IV	Data Structures	-	-	3	3	25	75	100	2
202PY1A2ID	IDC – II	Digital Logic and Circuits	4	-	-	3	25	75	100	4
Part - IV										
196BM1A2AA	AECC - II	Value Education - Human Rights	3	-	-	3	-	50	50	2
Total			23	1	6	-	-	-	750	24

BoS Chairman/HoD
Department of Computer Science with Data Analytics
Dr. N. G. P. Arts and Science College
Coimbatore - 641 048



Dr.NGPASC

COIMBATORE | INDIA

B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2TA	பகுதி-1: தமிழ் - தாள்- II	மொழி	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப் பாடங்களின் வாயிலாகத் தமிழரின் பண்பாடு, பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத் திறன்களை ஊக்குவித்தல்

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத்திறன்கள் (Life Skills) – மாணவனின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1,K2,K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2,K4
CO3	பாட இணைச் செயல்பாடுகள் (Co-curricular activities)	K2,K3,K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	M	M	M	M
CO3	S	M	M	M	M
CO4	S	M	M	M	M
CO5	S	M	M	M	M

S Strong

M Medium

L Low



Dr.NGPASC

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B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

191TL1A2TA	பகுதி-1: தமிழ் - தாள்- II	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I அற இலக்கியம் 12 h

1. திருக்குறள்

அ.அறன் வலியுறுத்தல் (அ. எண்: 04)

ஆ.நட்பாராய்தல் (அ. எண்: 80)

இ.சான்றாண்மை (அ. எண்: 99)

ஈ.குறிப்பறிதல் (அ. எண்: 110)

2. மூதுரை - ஒளவையார் (10 பாடல்கள் - 6,7,9,10,14,16,17,23,26,30)

Unit II அற இலக்கியம் 10 h

1. நாலடியார் - அறிவுடைமை

2.பழமொழி நானூறு - வீட்டு நெறி

3. கார்நாற்பது - தோழி பருவங்காட்டி தலைமகளை வற்புறுத்திய பாடல்கள்
(1முதல் - 18பாடல்கள்)

Unit III உரைநடை 10 h

1. பெற்றோர்ப் பேணல் - திரு.வி.க.

2. உள்ளம் குளிர்ந்தது - மு.வரதராசனார்

3. சங்கநெறிகள் - வ.சுப.மாணிக்கம்

Unit IV உரைநடை 13 h

1.பெரியார் உணர்த்தும்

சுயமரியாதையும் சமதர்மமும் - வே. ஆனைமுத்து

2. வீரவணக்கம் - கைலாசபதி

3.மொழியும்நிலமும் - எஸ். ராமகிருஷ்ணன்



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COIMBATORE | INDIA

B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

Unit V இலக்கிய வரலாறு, இலக்கணம் மற்றும் பயிற்சிப் பகுதி

15 h

அ.இலக்கிய வரலாறு

1. பதினெண் கீழ்க்கணக்கு நூல்கள்
2. தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்

ஆ. இலக்கணம்

1. வழு, வழுவமைதி, வழாநிலை

இ. பயிற்சிப் பகுதி

1. நூல் மதிப்பீடு மற்றும் திரைக்கதை திறனாய்வு
2. தன்விவரக் குறிப்பு எழுதுதல்

Note : பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

Text Books

- தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி (தன்னாட்சி)
- 1 செய்யுள் மற்றும் உரைநடைத் திரட்டு. (முதல்பதிப்பு.) சென்னை: நியூ செஞ்சுரி பக்ஹவுஸ் (பி) லிட்.

References

- 1 பேராசிரியர் புலவர் இளவரசு, சோம. (ஜூலை2012). தமிழ் இலக்கிய வரலாறு. (எட்டாம் பதிப்பு) சென்னை: மணிவாசகர் பதிப்பகம்.
- 2 பேராசிரியர் முனைவர் பாக்கியமேரி (2013). இலக்கணம் இலக்கிய வரலாறு மொழித்திறன். (முதல் பதிப்பு) சென்னை பூவேந்தன் பதிப்பகம்.
- 3 தமிழ் இணையக் கல்விக்கழகம் <<http://www.tamilvu.org/>>



Course Code	Course Name	Category	L	T	P	Credit
201TL1A2HA	HINDI -II	LANGUAGE	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories.	K1
CO2	Understand the principles of translation work.	K2
CO3	Apply the knowledge writing critical views on fiction.	K3
CO4	Build creative ability.	K3
CO5	Expose the power of creative reading.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong

M Medium

L Low



201TL1A2HA	HINDI -II	SEMESTER II
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Total Credits: 03

Total Instruction Hours: 60 h

Syllabus

Unit I 12 h

आधुनिक पद्य – शबरी (श्री नरेश मेहता)

प्रकाशक: लोकभारती प्रकाशन

पहली मंजिल, दरबारी बिल्डिंग,

महात्मा गाँधी मार्ग, इलाहाबाद-211001

Unit II 12 h

उपन्यास: सेवासदन-प्रेमचन्द

प्रकाशक: सुमित्र प्रकाशन

204 लीला अपार्टमेंट्स, 15 हेस्टिंग्स रोड

अशोक नगर इलाहाबाद-211001

Unit III 12 h

कहानी-किरीट- डा उषा पाठक / डा अचला पाण्डेय

पाठ 1. उसने कहा था

पाठ 2. कफ़न,

पाठ 3. चीफ़ की दावत

प्रकाशक: राधाकृष्ण प्रकाशन दिल्ली

Unit IV 12 h

पत्र लेखन: (औपचारिक या अनौपचारिक)

पुस्तक: व्याकरण प्रदिप – रामदेव

प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024

Unit V 12 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में)

(पाठ 1 to 10)

प्रकाशक: दक्षिण भारत प्रचार सभा चेन्नई -17



Course Code	Course Name	Category	L	T	P	Credit
201TL1A2MA	MALAYALAM - II	LANGUAGE	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories.	K1
CO2	Understand the principles of translation work.	K2
CO3	Apply the knowledge writing critical views on fiction	K3
CO4	Build creative ability.	K3
CO5	Expose the power of creative reading.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong

M Medium

L Low



201TL1A2MA	MALAYALAM -II	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I		12 h
	Travelogue	
Unit II	Novel	12 h
	Travelogue	
Unit III		14 h
	Travelogue	
Unit IV		10 h
	Autobiography	
Unit V		12 h
	Autobiography	

Text Books

- 1 Dubai Puzha (Travelogue) By K.Krishna Das, Published by Green books Thrissur.
- 2 Vazhithirivukal (Autobiography) By Dr.APJ Abdul Kalam Published by DC.Books Kottayam



Course Code	Course Name	Category	L	T	P	Credit
201TL1A2FA	FRENCH -II	LANGUAGE	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To Acquire Competence in General Communication Skills – Oral + Written – Comprehension & Expression.
- To Introduce the Culture, life style and the civilization aspects of the French people as well as of France.
- To help the students to acquire Competency in translating simple French sentences into English and vice versa.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents.	K1
CO2	To learn the adjectives and the classroom environment in France.	K2
CO3	Learn the Plural, Articles and the Hobbies.	K3
CO4	To learn the Cultural Activity in France.	K3
CO5	To learn the Sentiments, life style of the French people and the usage of the conditional tense.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong

M Medium

L Low



201TL1A2FA	FRENCH -II	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I

12 h

<ul style="list-style-type: none"> Proposer, accepter, refuser une invitation. Indiquer la date. 	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	<ul style="list-style-type: none"> Comprendre un message d'invitations sur un répondeur téléphonique. Inviter quelqu'un à accepter ou refuser l'invitation.
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Unit II

12 h

<ul style="list-style-type: none"> Prendre et fixer un rendez-vous. Demander et indiquer l'heure. 	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	<ul style="list-style-type: none"> Comprendre des personnes qui fixent un rendez-vous par téléphonique. Prendre un rendez-vous par téléphone
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Unit III

12 h

<ul style="list-style-type: none"> Exprimer son point de vue positif et négatif. S'informer sur le prix. S'informer sur la quantité. Exprimer la quantité. 	En groupes, choisir un cadeau pour un ami.	<ul style="list-style-type: none"> Exprimer son point de vue sur des idées de cadeau. Faire des achats dans un magasin
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Unit IV

12 h

<ul style="list-style-type: none"> Demander et indiquer une direction. Localiser (près de, en face de). 	Suivre un itinéraire à l'aide d'indications par téléphone et d'un plan.	<ul style="list-style-type: none"> Comprendre des indications de direction. Comprendre des indications de lieu.
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Unit V

12 h

<ul style="list-style-type: none"> Exprimer l'obligation et l'interdit. Conseiller. 	Par courrier électronique, donner des informations et des conseils à un ami qui veut voyager.	<ul style="list-style-type: none"> Comprendre une chanson. Comprendre de courts messages qui expriment l'obligation ou l'interdiction Donner des conseils à des personnes dans des situations données.
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Text Books

- 1 LATITUDES 1 (Méthode de français) Pages from 56 to 101, Author : RÉGINE MÉRIEUX Publisher : GOYAL Publishers & Distributors Pvt



Course Code	Course Name	Category	L	T	P	Credit
201EL1A2EA	ENGLISH - II	LANGUAGE	4	-	1	3

PREAMBLE

This course has been designed for students to learn and understand

- The effect of dialogue, the brilliance of imagery and the magnificence of varied genres
- The vocabulary and to frame sentence structure
- The transactional concept of English language

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Interpret skills in communication and to shape their attitude	K2
CO2	Develop oral and written language skills in a business context	K3
CO3	Analyze to gain key strategies and expressions for communicating with professionals	K3
CO4	Inspect the knowledge to the corporate needs	K4
CO5	Formulate Inter and Intrapersonal skills	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	S	S
CO3	M	S	S	S	M
CO4	S	S	M	S	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



201EL1A2EA	ENGLISH - II	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Technical English 12 h

Communication: Process- Methods- Channels- Barriers of Communications

Phonetics: Basics of phonetics - Consonants and Vowel sounds

Reading Skills: Skimming and Scanning- Reading Different Kinds of Texts- Types- Developing a Good Reading Speed

Writing Skills: Note- Making and note taking, Paragraph Writing: Structure and principles

Unit II Business English 12 h

Structure and Planning of Letters: Elements of Structure- Forms of Layout- Style- Writing Business Letters

Quotation, Order and Tender: Inviting - Sending Quotation letter - Placing Orders- Inviting Tenders

E-mail Correspondence: Structure- Procedure- Style- Guidelines- Jargon and Acronyms- Security Precaution

Seminar and Meetings: Introduction- Organizing a Seminar- Sample Brochure- Conducting and Participating in a Meeting

Unit III Professional English 12 h

Report Writing: Importance- Process- Types- Structure

Memo: Importance- Structure

Notice, Agenda and Minutes: Meeting- Notice- Agenda- Minutes: Preparation- Structure- Delivery

Brochures: Purpose- Audience- Qualities

Unit IV Employment Communication 12 h

Resume Writing : Elements of Resume - difference between CV and Resume - Writing Job Application

Art of Conversation: Small Talk- Body Language- Principles of Good Conversation

Interview: Organizational role- Goals- Types- Interview Process

Group Discussion: Importance- Features- Strategies- Barriers



Unit V Soft Skills

12 h

Self - Discovery and Goal Setting: Self - Discovery - Goals and Types- Benefits, Areas and Clarity of Goal Setting

Positive Thinking (PT) and Attitude: Benefits of PT and Attitude- Develop Positive Attitude and Thinking- Drive out Negative Thinking and Attitude

Etiquettes and Manners: Home, Table and Business, Time Management

Text Books

- 1 Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. Sparkle. (1st Edn.) McGraw - Hill Education. Chennai. [Unit I - V]

References

- 1 Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw - Hill Education, Chennai.
- 2 Adams, Katherine L. and Gloria I. Galanes. 2018. Communicating in Groups- Applications and Skills. McGraw - Hill Education, Chennai.
- 3 Koneru, Aruna. 2017. Professional Communication. McGraw - Hill Education, Chennai.
- 4 Koneru, Aruna. 2011. English Language Skills. McGraw - Hill Education, Chennai.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A2CA	DATA SCIENCE WITH PYTHON	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The technologies related to Data Science
- Major features of the Python Language
- Python libraries to solve problems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Describe the technologies related to Data Science	K2
CO2	Develop solutions to simple computational problems using Python	K5
CO3	Relate Python lists, tuples and dictionaries for representing compound data	K3
CO4	Develop solutions using Python NumPy	K5
CO5	Develop solutions using Pandas and demonstrate data visualization.	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



194DA1A2CA	DATA SCIENCE WITH PYTHON	SEMESTER II
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Data Science 10 h

Understanding Data: Introduction-Types of Data: Numeric - Categorical - Graphical - High Dimensional Data - Sources of Data: Time Series - Transactional Data - Biological Data - Spatial Data - Social Network Data- Data Science Components: Statistics - Mathematics - Programming Languages - Database - Machine Learning - Big data technology - Data Science Applications

Unit II Python Expressions and Loops 12 h

Introduction to Python - Values and Types - Operators - Expressions - Statements- Precedence of operators - Decision Statements - If - If Else Iteration : While - For - Break - Continue - Functions: Introduction : Parameters and arguments - Variable Scope - Return statement

Unit III Strings and Tuples 13 h

Strings - String slices- Immutability- String methods and operations -Lists: Creating lists - List operations - List methods - Passing list to a function - Sets: Creating sets- Set operations. Tuples: Creating Tuples - Operations on Tuples- Lists and tuple - Dictionaries: Creating Dictionaries - Operations and methods- Nested Dictionaries

Unit IV NumPy 12 h

Introduction to NumPy - NumPy Datatypes - N Dimensional data structures: Creating NumPy arrays - Arrays from existing Data - Array manipulation: Transpose operations - Joining arrays - Splitting arrays - NumPy operations : Indexing and Slicing

Unit V Pandas and Data Visualization 13 h

Introduction: Series: Creating Series- Accessing Series - Data Frames: Creating frames- operations on rows and columns - Group By: Aggregation - Transformation - Filtration- Merging and Joining - Manipulating Dates - Data Visualization using matplotlib



Text Books

- 1 Ashok Namdev Kamthane, Amit Ashok Kamthane, 2018, "Programming and Problem Solving with Python", 2nd Edition, McGraw Hill Education
- 2 Davy Cielen, Arno D.B. Meysman, 2016," Introducing Data Science: Big Data, Machine Learning, and More Using Python Tools",1st Edition, DreamTech Press

References

- 1 Mark Summerfield, 2009," Programming in Python",3rd Edition, Pearson Education
- 2 Wesley J. Chun, 2006," Core Python Programming",2nd Edition, Pearson Education.
- 3 www.python.org



Course Code	Course Name	Category	L	T	P	Credit
194DA1A2CB	DATA STRUCTURES AND ALGORITHMS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The design of algorithms and linear and non-linear data structures
- The implementation of various sorting and searching techniques and their performance comparison
- The techniques to write efficient programs

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Compare different programming methodologies and Explain the analysis of algorithms	K2
CO2	Apply linear data structures like arrays, stacks and queues to solve problems.	K3
CO3	Construct linked list and its variants to solve problems	K5
CO4	Create programs using Trees and Graphs	K5
CO5	Apply the appropriate techniques for searching and sorting	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	M
CO2	S	M	S	M	M
CO3	S	M	S	M	M
CO4	S	S	S	M	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



194DA1A2CB	DATA STRUCTURES AND ALGORITHMS	SEMESTER II
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction and Algorithm Analysis 8 h

Introduction to Algorithms - Algorithmic Notations - Approaches to designing an algorithm : Top-Down - Bottom up - Top down Vs bottom up - Complexity of Algorithms - Primitive Data Structures - Arrays: Introduction-: Linear Arrays: Representation - Traversal - Insertion - Deletion - Two dimensional Arrays - Sparse Matrix

Unit II Stacks and Queues 10 h

Stacks : Array Representation of Stacks - Linked Representation of Stacks - Arithmetic Expressions - Polish Notation - Evaluation of Postfix Expression - Infix to Postfix Conversion - Queues : Representation of Queues - Linked Representation of Queues - Deques - Priority Queues

Unit III Linked List 10 h

Linked List: Introduction - Representation of Linked Lists in Memory- Traversing a Linked List - Memory Allocation - Garbage Collection - Insertion into a Linked List- Deletion from a Linked List - Header Linked Lists - Two way Lists - Polynomials: Representing Polynomials as Singly Linked Lists

Unit IV Trees 10 h

Introduction - Binary Trees: Definition - Representing Binary Trees in Memory - Traversing Binary Trees : Preorder - Inorder - Postorder - Graphs: Terminology - Directed Graphs - Sequential Representation of Graphs - Adjacency Matrix - Path Matrix

Unit V Sorting and Searching 10 h

Sorting : Introduction - Types of Sorting: Internal Sorting - External Sorting - Bubble Sort - Insertion Sort - Selection Sort - Quick sort - Merge Sort - Radix sort - Comparison of Sorting techniques - Searching : Linear Search - Binary Search



Text Books

- 1 Seymour Lipschutz, 2009, "Data Structures", 5th Edition, Tata McGraw-Hill Publishing Company Limited

References

- 1 Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, 2002," Data structures and Algorithms",2nd Edition, Pearson Education, Asia
- 2 Yashwant Kanetkar, 2010," Data Structures Through C", 9th Edition, BPB Publications.
- 3 Robert L Kruse, 2008," Data Structures and Program Design"2nd Edition, Prentice Hall



194DA1A2CP	CORE PRACTICAL: PYTHON PROGRAMMING	SEMESTER II
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Total Credits: 2

Total Instructions Hours: 36 h

S.No	List of Experiments
1	Program to Implement Control statements in Python.
2	Program to Demonstrate String functions in Python
3	Program to Implement Dictionary and Sets in Python
4	Programs to work with Python Tuples
5	Program for operations on NumPy arrays
6	Program to test math functions using NumPy
7	Pandas program for analysis using Pivot table
8	Program to query Dataframes using Pandas
9	Program for Customer Data Analysis
10	Program for Customer Data Visualization

Note: Eight Programs are Mandatory



194DA1A2CQ	CORE PRACTICAL: DATA STRUCTURES	SEMESTER II
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Total Credits: 2

Total Instructions Hours: 36 h

S.No	List of Experiments
1	Program for array manipulation
2	Program to perform the following operations for Stack using array implementation. i.) Push ii.) Pop iii.) Display
3	Program to evaluate expressions using Stack
4	Program to convert infix expression to postfix expression using Stack
5	Program to perform the following Queue operations i.) Insert ii.) Delete iii.) Display.
6	Program to perform addition of two polynomials using Linked list
7	Program to implement Linear Search
8	Program to implement Binary Search using recursion
9	Program to Perform Bubble Sort
10	Program to Perform Quick Sort

Note: Eight Programs are Mandatory (using 'C')



Course Code	Course Name	Category	L	T	P	Credit
202PY1A2ID	DIGITAL LOGIC AND CIRCUITS	IDC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of number systems, conversion and binary coding.
- The concepts of logic gates and Boolean algebra.
- The construction of logic and sequential circuits.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Infer the basics about various number systems.	K2
CO2	Demonstrate the concepts of logic gates.	K2
CO3	Construct circuit diagrams using Boolean algebra.	K3
CO4	Build skill for constructing logic circuits.	K3
CO5	Illustrate the working of different flip-flop circuits.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	L	L	M	S
CO2	M	L	L	M	S
CO3	S	M	L	S	S
CO4	S	M	L	S	S
CO5	M	L	L	M	S

S Strong

M Medium

L Low



202PY1A2ID	DIGITAL LOGIC AND CIRCUITS	SEMESTER II
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Number Systems 8 h

Introduction: Decimal, binary, octal and hexadecimal number systems-
Conversions-Binary arithmetic: addition, subtraction and multiplication -
Complement Systems: 1's complement and 2's complement- Negative numbers-
Binary codes: Introduction- Weighed- Non-weighted

Unit II Logic Gates 8 h

Logic Gates: OR, AND, NOT, NAND, NOR, XNOR AND XOR Gates- Logic
symbols - Logic operators - Logic expressions - Truth table - Basic, universal and
exclusive gates - Conversion of universal gates to basic gates

Unit III Boolean Algebra 8 h

Introduction to boolean algebra: Basic laws of boolean algebra- Logical addition
and multiplication- De Morgan's theorems- Two variable and three variable -
Karnaugh maps (upto four variables) - Reduction of expression: Sum of product
simplification - Product of sum simplification.

Unit IV Combinational Logic Circuits 12 h

Arithmetic circuits and combination circuits: Introduction - Designing of a logic
circuit -Adders - Half adder - Full adder - Subtractor - Half subtractor - Full
subtractor - Parallel binary adder - Decimal adder - Binary coded decimal adder -
Encoder - Decoder - Multiplexer - De-multiplexer.

Unit V Sequential Circuits 12 h

Storage Elements and Counters: Introduction Sequential Circuits- Latches - R-S flip
flop- Clocked R-S flip flop - D flip flop -JK flip flop - T Flip flop- Counters- Ripple
counter- Modulo N counter - Shift registers - Types - Parallel in parallel out -
Parallel in serial out - Serial in serial out - Serial in parallel out.



Text Books

- 1 Leach D D, Malvino P A, Saha G, 2016, “Digital Principles and Applications”, 8th Edition, Tata McGraw Hill Publishing Company Ltd, New York

References

- 1 Mano M M, 2007, “Digital Design”, 4th Edition, Pearson Education, US
- 2 Puri V K, 2007, “Digital Electronics Circuits and Systems”, 13th Edition, Tata Mc Graw Hill, India.
- 3 Saha A, Manna N, 2007, “Digital Principles and Logic Design”, 2nd Edition, Infinity Science Press, New Delhi.
- 4 Flyod T L, 2002, “Digital Fundamentals”, 8th Edition, Pearson Education, India.



Course Code	Course Name	Category	L	T	P	Credit
196BM1A2AA	HUMAN RIGHTS	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- To study how human values and personality traits help to develop the characteristics of each individual
- Understanding the moral values towards the enrichment of the society
- Identify the impact of ethics and values on the global development of the current scenario

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of human values, personality traits and character formation.	K2
CO2	Acquire the knowledge through value education towards national and global development.	K1
CO3	Introduce the basic concepts of conflict, emotions and adolescent emotions.	K1
CO4	Illustrate the techniques in therapeutic measures like yoga and meditation.	K2
CO5	Learn the concepts of human rights, rights for women and children and domestic violence.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	M	S	S	S
CO3	S	S	M	S	S
CO4	S	S	S	S	M
CO5	S	S	S	S	S

S Strong

M Medium

L Low



196BM1A2AA	HUMAN RIGHTS	SEMESTER II
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Human Values 05 h

Concept of Human Values - Value Education Towards Personal Development - Aim of education and value education - Evolution of value oriented education - Concept of Human values - Types of values - Components of value education - Personal Development: Self analysis and introspection - Sensitization towards gender equality - Physically challenged - Intellectually challenged - Respect to age - Experience - Maturity - Family members - Neighbours - Co-workers - Character Formation towards Positive Personality: Truthfulness - Constructivity - Sacrifice - Sincerity - Self Control - Altruism - Tolerance - Scientific Vision.

Unit II Value Education and Social Values 05 h

Value Education Towards National and Global Development National and International Values: Constitutional or national values - Democracy - Socialism - Secularism - Equality - Justice - Liberty - Freedom and fraternity -Social Values - Pity and probity - Self control - Universal brotherhood - Professional Values - Knowledge thirst - Sincerity in profession - Regularity - Punctuality and faith - Religious Values - Tolerance - Wisdom - Character - Aesthetic values - Love and appreciation of literature and fine arts and respect for the same - National Integration and international understanding.

Unit III Global Development on Ethics and Values 04 h

Impact of Global Development on Ethics and Values: Conflict of cross-cultural influences - Mass media - Cross-border education - Materialistic values - Professional challenges and compromise - Modern Challenges of Adolescent Emotions and behave or Sex and spirituality: Comparison and competition - Positive and negative thoughts - Adolescent Emotions - Arrogance - Anger - Sexual instability - Selfishness - defiance.

Unit IV Yoga and Meditation 05 h

Therapeutic Measures: Control of the mind through - Simplified physical exercise - Meditation - Objectives - Types - Effect on body - Mind - Soul - Yoga - Objectives - Types - Asanas - Activities: Moralisation of Desires -Neutralisation of Anger - Eradication of Worries - Benefits of Blessings.




Unit V Human Rights and Rights of Women and Children

05 h

Human Rights - Concept of Human Rights – Indian and International Perspectives
 - Evolution of Human Rights - Definitions under Indian and International documents - Broad classification of Human Rights and Relevant Constitutional Provisions - Right to Life - Liberty and Dignity - Right to Equality - Right against Exploitation - Cultural and Educational Rights - Economic Rights - Political Rights - Social Rights - Human Rights of Women and Children - Social Practice and Constitutional Safeguards - Female Foeticide and Infanticide - Physical assault and harassment - Domestic violence - Conditions of Working Women - Institutions for Implementation - Human Rights Commission - Judiciary - Violations and Redressal Violation by State - Violation by Individuals - Nuclear Weapons and Terrorism Safeguards.

References

- 1 Brain Trust Aliyar, 2008, Value Education for health, happiness and harmony. Vethathiri publications, Erode
- 2 Grose. D. N, 2005, A text book of Value Education. Dominant Publishers and Distributors, New Delhi.
- 3 Yogesh Kumar Singh & Ruchika Nath, 2005, Value Education, P. H Publishing Corporation, New Delhi.
- 4 Venkataram & Sandhiya. N, 2001, Research in Value Education, APH Publishing Corporation, New Delhi.
- 5 Seetharam. R. (Ed), 1998, Becoming a better Teacher Madras Academic Staff College.
- 6 Brain Trust Aliyar, 2004, Value Education for Health, Happiness and Harmony. Vethathiri publications, Erode.
- 7 Swami Vivekananda, 2008, Personality Development. Advaita Ashrama, Kolkata.
- 8 Dey A. K, 2002, Environmental Chemistry. New Delhi – Vile Dasas Ltd.


BoS Chairman/HoD
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Dr.NGPASC

COIMBATORE | INDIA

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part - III										
194DA1A3CA	Core - IV	Computer Networks	5	-	-	3	25	75	100	4
194DA1A3CB	Core – V	Database Management Systems	5	-	-	3	25	75	100	4
194DA1A3CP	Core Practical - V	Database Management Systems	-	-	4	3	40	60	100	2
194DA1A3SA	SEC - I Theory	R Programming	3	1	-	3	25	75	100	4
194DA1A3SP	SEC - II Practical	R Programming	-	-	4	3	40	60	100	2
192MT1A3IF	IDC – III	Applied Statistics	4	-	-	3	25	75	100	4
	GE-I		2	-	-	2	-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A3AA	AECC - III	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A3AB		Advanced Tamil								
195CR1A3AA		Women’s Rights								
Total			21	1	8				700	24

GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective Course

Semester III (GE-I)

S. No.	Course Code	Course Name
1	194DA1A3GA	Introduction to Data Analytics

EXTRA CREDIT COURSES

The following are the courses offered under self study to earn extra credits:

S. No.	Course Code	Course Name
1	204DA1ASSA	Software Testing
2	204DA1ASSB	Decision Support Systems



Course Code	Course Name	Category	L	T	P	Credit
194DA1A3CA	COMPUTER NETWORKS	CORE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic taxonomy of Computer Networks
- Major features of the OSI model
- The design issues and Protocols

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Describe the functions of each layer in OSI and TCP/IP model	K1
CO2	Explain the functions of Physical and Data Link layers and Presentation layer paradigms and Protocols.	K2
CO3	Understand the Network design issues	K2
CO4	Describe the Transport layer services	K1
CO5	Understand the Functions of data Application Layer and explain the protocols.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	M
CO2	S	M	S	M	M
CO3	S	M	S	M	M
CO4	S	M	S	M	M
CO5	S	M	S	M	M

S Strong

M Medium

L Low



194DA1A3CA	COMPUTER NETWORKS	SEMESTER III
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Computer Networks 10 h

Introduction : Components of Computer Networks - Data Representation - Distributed processing - Network criteria - Physical Structure - Categories of Networks - Interconnection of Networks - Protocols and standards - Standard organization - Network models - OSI Reference :The TCP/IP Reference model

Unit II Physical and Data Link Layer 12 h

Introduction - Network Topologies - Switching - Multiplexing - Transmission Medium: Guided medium: Twisted Pair - Coaxial -fiber optics - Wireless Transmission: Electromagnetic spectrum - Radio - Transmission - Microwave Transmission - Data Link Layer: Goals - Design Issues - Error Detection and Correction - Data Link Protocols - Sliding Window protocol

Unit III Network Layer 12 h

Introduction : Design Issues of Network Layer - Routing - Types of routing Algorithms: Optimality Principle - Shortest path - Flooding - Distance Vector - Hierarchical Routing - Link State routing - Congestion Control - The IP Protocol - IP Address: Subnets - CIDR - Internet control Protocols: IPV4 - IPV6

Unit IV Transport Layer 14 h

Introduction: TCP Basics - Service of Transport Layer - Service Primitives : Connection Establishment - Connection Release - Transmission Policy - Congestion control - UDP : Introduction - Inter Process Communication - Remote Procedure Call - Real time transport protocol

Unit V Application Layer 12 h

Domain Name System : DNS Name Space - Resource Records - Name Servers - Electronic Mail: Architecture and Service - User Agents - Message Formats - Message Transfer - World Wide Web: Architecture - Static Web page - Dynamic Web page -The Hyper Text Transfer Protocol



Text Books

- 1 Andrew S.Tanenbaum, (2010), "Computer Networks", (5th Edn.), Prentice Hall(Unit I, II)
- 2 Behrouz A.Forouzan, (2011), "Data Communication and Networks", (4thEdn.): Tata Mc Graw hill(Unit III-V)

References

- 1 Larry L.Peterson, (2011).,"Computer Networks", (5th Edn.):Morgan Kaufman
- 2 Achyut Godbole, (2009),"Data Communication and Networks",(4thEdn.): Tata Mc Graw hill



Course Code	Course Name	Category	L	T	P	Credit
194DA1A3CB	DATABASE MANAGEMENT SYSTEMS	CORE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The technologies related to databases
- Various types of data models
- Efficient database design

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of databases	K2
CO2	Understand the various database models and apply relational operations	K3
CO3	Design databases using Normalization techniques.	K6
CO4	Understand about storage Techniques	K2
CO5	Understand Transaction Management	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	M
CO2	S	M	S	L	M
CO3	M	S	M	S	M
CO4	S	S	L	M	M
CO5	L	S	M	S	M

S Strong

M Medium

L Low



194DA1A3CB	DATABASE MANAGEMENT SYSTEMS	SEMESTER III
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Database 10 h

Introduction to databases – Conventional file processing – Purpose of database system – Characteristics of database approach – Advantages of using DBMS – Database architecture – Data Abstraction and Models – Instances and Schema – Data Independence – Schema Architecture – Components of a DBMS – Database Languages – Database Manager – Database Administrator – Database Users

Unit II Relational Model 12 h

Introduction: Basic concepts – Relational Model Constraints and Database Schema – Basic SQL: Data Definition and Data Types – Specific constraints in SQL – Basic retrieval operations in SQL – Insert, Update, Delete statements in SQL – Additional Features of SQL – Views in SQL – Schema change Statement in SQL

Unit III Database Design 14 h

Database design process – Relational Database Design – Relation Schema – Anomalies in a database – Functional dependencies – Axioms – closure of a set of FD's – minimal covers – Normal forms based on primary keys – Second Normal form, Third Normal form, Boyce-Codd Normal form – Properties of relational decomposition – Multi-valued dependencies – Fourth Normal form

Unit IV Data Storage 12 h

Introduction: Overview of Physical Storage – Magnetic disk and Flash Storage – RAID – Tertiary Storage – File Organization – Organization of Records in Files – Indexing and Hashing : Basic Concepts – Ordered Indices – B+ Tree Index Files – Static Hashing – Dynamic Hashing – Comparison of Indexing and Hashing

Unit V Transaction and Concurrency Control 12 h

Transaction Concept – Simple Transaction Model – Transaction Atomicity and Durability – Transaction Isolation – Serializability – Transaction Isolation and Atomicity- Transaction as SQL Statements – Concurrency Control: Lock Based Protocols – Timestamps-Based Protocols – Validation Based Protocols



Text Books

- 1 Elmasri Ramez and Navathe Shamkant.B,(2010), “Fundamentals of Database System Concepts”, (6th Edn.), Addison Wesley(Unit I, II)
- 2 A.Silberchartz, H.F.Korth,(2006),“Database System concepts”, (6th Edn.), Mc Graw Hill(Unit III-V)

References

- 1 Raghuram Krishnan, Johnanes Gehrke,(2011), “Database Management System”, (3rd Edn.),Mc Graw Hill
- 2 O`neil Patricand, O`neil Elizabeth,(2008), “Database Principles, Programming and Performance”,(2nd Edn.), Margon Kaufmann Publishers Inc



194DA1A3CP	CORE PRACTICAL : DATABASE MANAGEMENT SYSTEMS	SEMESTER III
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Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Program to create a database to set various constraints
2	Program to create a database and apply the Data Definition Language
3	Program in SQL Queries to Perform the Data Manipulation Language
4	Program to perform expression and Conditions
5	Program to perform aggregate functions for database
6	Program to perform views, Synonyms and Sequence
7	Program to create and implement Views and Joins
8	Program to perform Cursors
9	Program to work with PL/SQL
10	Program to implement Triggers
11	Program for database design using ER Model
12	Program to Apply Normalization

Note: Out of 12-10 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
194DA1A3SA	R PROGRAMMING	SEC	3	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The technologies related to Statistics in R
- Major features of the R Programming
- R Visualization and graph to solve problems

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the Basics of R Programming	K2
CO2	Understand the control statements, loops and functions in R Programming	K2
CO3	Construct R data objects like Data Frames, Factors and Vectors.	K3
CO4	Construct the Data and use R to prepare data for analysis	K3
CO5	Develop and Visualize the data with R's graphics	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	M	S	M	M	S
CO3	S	M	S	S	M
CO4	S	S	L	L	S
CO5	M	L	S	S	M

S Strong

M Medium

L Low



194DA1A3SA	R PROGRAMMING	SEMESTER III
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to R 9 h

Evolution of R – Features of R – Design of the R System – Limitation of R – R Resources – Interactive Mode – Batch Mode – Entering Input – R Objects – Numbers – Attributes – Vectors – Matrices – Lists – Factors – Data Frames – Data In and Out of R – Dates and Times in R – Subsetting R Objects

Unit II Control Structures and Functions 10 h

Data Types-Variable – Operators if- if...else – Switch – For Loops – Nested For Loops – While Loops – Repeat Loops – Next – Break – Functions: Arguments – Return Values – Functions as a Arguments : Anonymous and Properties of Functions – Argument order and Named Arguments

Unit III Data Objects in R 10 h

Vectors – Adding and Deleting Vector Elements – Length of a vector – Matrices and Array as vectors – Common vector operations – Factors : Factors and Levels – Common functions used with Factors – Data Frames : Creating Data Frames – Merging Data Frames – Applying Functions to Data Frames

Unit IV Working with Data in R 10 h

Preparing Data: Combining Data Sets – Transformation :Reassigning Variables – Transform Functions – Applying functions to each elements of an object – Saving – Loading and Editing the Data : Entering Data – Importing data from a File – Exporting data Objects –Data Extract from CSV and Excel File

Unit V Data Visualization in R 9 h

R Graphics : Line Graph – Scatter Plot – Bar Charts – Pie Charts – Box Plots – Histogram – Customizing the Charts :Common Arguments to Chart Functions – Graphical Parameters – Basic Graphic Functions : Points – Lines – Curve – Text – Title – Legend – Box – Axis –R Statistics: Mean –Median- Mode-Linear Regression



Text Books

- 1 Roger D.Peng, (2015), “R Programming for Data Science” (1st Edn.), Lean Publishing(Unit I-III)
- 2 Joseph Adler,(2012), “R in a Nutshell”, (1st Edn.), O'Reilly Media, Inc (Unit IV, V)

References

- 1 Norman S. Matloff,(2011),"The Art of R Programming",(1st Edn.), Starch Press.
- 2 Sandip Rakshit,(2017)," R Programming For Beginners", (1st Edn.), Mc Graw Hill



194DA1A3SP	SEC PRACTICAL : R PROGRAMMING	SEMESTER III
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Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Program to Implement Control statements in R
2	Program to Demonstrate functions in R
3	Program to Perform using Matrices and Arrays in R
4	Program to implement String and List operations in R
5	Program to create and Manipulation of Vector and Factors in R.
6	Program to perform operations on Data Frame
7	Program to work with CSV files in R
8	Program to Create ,Customize and Saving Graphs and Charts in R
9	Program to perform customer segmentation Project in R
10	Program to perform Sentiment analysis in R.

Note: Out of 10 – 8 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
192MT1A3IF	APPLIED STATISTICS	IDC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Basic concepts of Sampling Theory
- Apply the concepts to solve the testing of hypothesis problems
- Concepts of Association of attributes in Chi-square tests

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain sampling theory and sampling errors	K1
CO2	Apply concept in test of significance	K2
CO3	Interpret association of attributes and their usage	K3
CO4	Examine the analysis of time series method	K3
CO5	Analyses concept of index number	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	S
CO2	L	S	S	M	S
CO3	L	M	S	M	M
CO4	M	S	M	S	S
CO5	M	S	M	S	S

S Strong M Medium L Low



192MT1A3IF	APPLIED STATISTICS	SEMESTER III
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Sampling Theory 8 h

Finite and Infinite Population-Hypothetical and existent population-Census method-Sample method-Essentials of sampling- Method of sampling-Random sampling method-Non-Random sampling- Law of Statistical regularity- Law of Inertia of large numbers- Statistical errors- Absolute error- Relative and Reducing Sampling errors

Unit II Test of Significance 10 h

Introduction – Estimation- Point Estimation-Interval estimation-Confidence limit- Testing of Hypothesis-Null hypothesis- Alternative hypothesis-Level of significance- Critical region- Standard error- Test of significance of attributes-Sampling of attributes- Sampling of variable- Student t- distribution

Unit III Association of Attributes 10 h

Classification –Uses of Terms Positive and Negative classes- Number classes-Ultimate Class frequencies- Order of classes- Relationship-Determination of frequencies- Consistency of data- Types of association- Methods of determining association- Chi-square test-Degrees of freedom-Test of goodness of fit- Test of independence-Yate's correction

Unit IV Time Series Analysis 10 h

Definition of time series - Uses of Time series analysis- Time series models - Components of time series –Adjustment of time series data- Measurement of secular trend- Graphic method- Semi-Average method- Moving average method-Method of least square-Measurement of seasonal variation

Unit V Index Number 10 h

Definition of Index number– Characteristics- Uses- Types of index numbers-Problems of Construction of index numbers-Methods of constructing index numbers- Test of consistency of index number - Consumer price index number-Method of constructing consumer price index number

Note: Theory 20% and Problem 80%



Text Book

- 1 Pillai Bagavathy, R.S.N, 2016, "Statistics Theory and Practice", 14th Edition, Sultan Chand and Sons, New Delhi

References

- 1 Das, N.G, 2017, "Statistical Methods", Combined Edition (Volume I and Volume II, 16th Edition, TATA McGraw Hill Education, New Delhi .
- 2 Douglas C.Montgomery George C.Runger, 2014, "Applied Statistics and Probability for Engineers", 6th Edition, John Wiley and Sons, New Delhi
- 3 Gupta, S.P, 2017, "Statistical Methods", 16th Edition, Sultan Chand and Sons, New Delhi
- 4 Gupta, S.C and Kapoor, V.K, 2017, "Fundamentals of Applied Statistics", Sultan Chand and Sons, New Delhi



194DA1A3GA	INTRODUCTION TO DATA ANALYTICS	SEMESTER III
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Total Credit: 2

Syllabus

Unit I Data 5h

Data: Definition - Data Classification: Qualitative Data - Quantitative Data : Nominal - Ordinal - Interval - Ratio - Data Vs Information - Classification of information: Classification by characteristics - Classification by application- Classification by Management hierarchy - Data Collection Methods

Unit II Data Processing 5h

Data Processing: Introduction - Data Processing Cycle - Methods of Data Processing: Batch Processing- Real Time Processing - On-line Processing - Distributed Processing - Files - Operations on files - File organization: Sequential - Indexed - Random

Unit III Database Management Systems 5h

Introduction to Database- The Database Approach - Database Management Systems - Characteristics of Database Management Systems - Data Models - Schema - ER Model Basic Concepts - Introduction to Data Warehousing

Unit IV Data Analytics 5h

Data Analytics: Related Technologies - Statistics - Mathematics - Programming Languages - Database - Machine Learning - Big Data Technology - Data Mining - Stages of the Data Mining Process - Data Visualization

Unit V Applications 4h

Data Analytics Applications: Healthcare Sector - Entertainment and Media Industry - Hotel and Tourism Industry - Retail Sector - Social Media Analytics

Text Books

- 1 Maheshwari, (2017), " Data Analytics ", 1st Edition, McGraw Hill



191TL1A3AA	பகுதி - 4 : அடிப்படைத்தமிழ்தாள் : 1(Basic Tamil)	SEMESTER III
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Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019-20ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது (10 மற்றும் 12 - ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு) (பருவத் தேர்வு உண்டு)

அலகு : 1 தமிழ் மொழியின் அடிப்படைக் கூறுகள் 12 h

அ) எழுத்துகள் அறிமுகம் :

1. உயிர் எழுத்துக்கள் - குறில் , நெடில் எழுத்துகள்
2. மெய் எழுத்துக்கள் - வல்லினம், மெல்லினம், இடையினம்
3. உயிர்மெய் எழுத்துக்கள்

ஆ) சொற்களின் அறிமுகம்: பெயர்ச்சொல், வினைச்சொல் - விளக்கம் (எ.கா.)

அலகு : 2 குறிப்பு எழுதுதல் 12 h

1. பெயர், முகவரி, பாடப்பிரிவு , கல்லூரியின் முகவரி
2. தமிழ் மாதங்கள்(12), வாரநாட்கள்(7),
3. எண்கள் (ஒன்று முதல் பத்து வரை), வடிவங்கள், வண்ணங்கள்
4. ஊர்வன, பறப்பன, விலங்குகள், மனிதர்களின் உறவுப்பெயர்கள்
5. ஊர்களின்பெயர்கள் (எண்ணிக்கை 10)
6. பயிற்சிப் பகுதி (உரையாடும் இடங்கள்) : வகுப்பறை, பேருந்து நிலையம், சந்தை

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி -அ

சரியான விடையைத் தேர்வு செய்தல்

10x2=20

பகுதி -ஆ

சரியா? தவறா? தேர்ந்தெடுத்து எழுதுக .

10x2=20

பகுதி-இ

ஒரு பக்க அளவில் விடையளிக்க

03x20=60

குறிப்பு:

- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ-க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அந்தந்த அலகுகளில் அமைதல் வேண்டும்



Dr.NGPASC

COIMBATORE | INDIA

B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

Text Books

- 1 அடிப்படைத் தமிழ். 2019. தொகுப்பு : தமிழ்த் துறை, டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை

References

- 1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம்
- 2 வலைதள முகவரி : <http://tamilvu.org>



191TL1A3AB	பகுதி - 4 : சிறப்புத் தமிழ் தாள் : 1 (Advanced Tamil)	SEMESTER - III
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Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019- 2020 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது (10 மற்றும் 12 - ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது)(பருவத் தேர்வு உண்டு)

அலகு - 1 மரபுக் கவிதைகள் 05 h

அ) பாரதியார் கவிதைகள்

- தமிழ்நாடு
- மனதில் உறுதி வேண்டும்
- வருகின்ற பாரதம் (பா.எண்.5-8)

ஆ) பாரதிதாசன் கவிதைகள்

- இன்பத்தமிழ்
- நீங்களே சொல்லுங்கள்
- வாளினை எட்டா!

இ) தாராபாரதி கவிதைகள்

- வேலைகளல்ல வேள்விகள்

அலகு - 2 புதுக்கவிதைகள் 05 h

- கம்பன் கவியரங்கக் கவிதை - மு.மேத்தா
- தமிழா! நீ பேசுவது தமிழா! - காசியானந்தன்
- நட்புக் காலம் (10 கவிதைகள்) - அறிவுமதி கவிதைகள்

அலகு - 3 இலக்கணம் 04 h

- வல்லினம் மிகும் மற்றும் மிகா இடங்கள்
- ர, ற, - ல, ழ, ள - ந, ண, ன - ஒலிப்பு நெறி, பொருள் வேறுபாடு அறிதல்

அலகு - 4 கடிதங்கள் எழுதுதல் 05 h

- பாராட்டுக் கடிதம்
- நன்றிக் கடிதம்
- அழைப்புக் கடிதம்
- அலுவலக விண்ணப்பங்கள்

அலகு - 5 பாடம் தழுவிய வரலாறு 05 h

- பாரதியாரின் இலக்கியப் பணி
- பாரதிதாசனின் இலக்கியப்பணி
- மரபுக்கவிதை, புதுக்கவிதை - விளக்கம்



Dr.NGPASC

COIMBATORE | INDIA

B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

வினாத்தாள் அமைப்பு முறை -

மொத்த மதிப்பெண்கள் - 100

சரியான விடையைத் தேர்வு செய்தல்	பகுதி -அ	10x2=20
கோடிட்ட இடங்களை நிரப்புக.	பகுதி -ஆ	10x2=20
இரண்டு பக்க அளவில் விடையளிக்க	பகுதி -இ	4x15=60

குறிப்பு:

- பகுதி -அ அனைத்து அலகுகளில் இருந்தும் இரண்டு வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ -க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அந்தந்த அலகுகளில் அமைதல் வேண்டும்

Text Books

- 1 சிறப்புத் தமிழ் . 2019. தொகுப்பு: தமிழ்த் துறை, டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை

References

- 1 புலவர் சோம. இளவரசு - 2014. இலக்கிய வரலாறு, மணிவாசகர் பதிப்பகம், சென்னை - 108
- 2 வலைதள முகவரி : <http://tamilvu.org>



195CR1A3AA	WOMEN'S RIGHTS	SEMESTER III
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Total Credits: 2

Total Instruction Hours: 24h

Syllabus

Unit I Rights to Infant & Child 4 h

Issues for women in India- Law relating to Female infanticide-Rights to the survival of a child-Child Labour- Child trafficking –Child Marriage- Protection of Children against Sexual Offences Act 2012 (POCSO)

Unit II Rights to women 5 h

Matrimonial protection-Protection against dowry-Protection to pregnancy-Sexual offences-Law relating to work Place- Directive principles of Constitution (Article 39 a, d, e & Article 42, 43 & 46) - Trafficking of women

Unit III Laws for Senior Citizen women 5 h

Constitutional Rights –Personal Laws- The Tamil Nadu Maintenance and Welfare of Parents and Senior Citizens Rules in 2009- The National Council for Older person- Government Provisions for elderly persons

Unit IV Civil and Political Rights of Women 5 h

Right of inheritance-Right to live with decency and dignity-The Married women's Property Act 1874-Personal law women's right to property-Women Reservation Bill-National Commission for Women-Political participation Pre independent political participation of women-Participation of Women in post independent period

Unit V International convention on Womens' Right 5 h

Convention on the Elimination of All Forms of Discrimination against Women(CEDAW)-United Nations population Fund(UNFPA)-Protocol to the African Charter on the rights of women in Africa-Convention on the Nationality of Married women-Convention on the political rights of women- Inter-American convention on granting of civil and political rights for women-Universal declaration of Human rights



Text Books

- 1 Women & Law(2009)-Krishna Pal Malik-Allahabad Law University, Delhi

References

- 1 Women's Human Rights in India(2019)-Christian Foster and Jaya Sagade- Routledge India
Justice for Women: Concerns and Expressions (2008)-Anand AS –Universal Law
- 2 Publishing Co.



204DA1ASSA	SOFTWARE TESTING	SEMESTER III
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Total Credit: 1

Syllabus

Unit I Functional Testing

Introduction- Software failures- Testing Process-Testing terminologies -Limitation of testing- V shaped software lifecycle model. Functional Testing: Boundary Value Analysis - Equivalence Class Testing - Decision Table Based Testing

Unit II Structural Testing

Structural Testing and Software verification: Control flow testing- Data flow testing- Slice based testing- Mutation Testing - Verification methods- Software Requirements Specification(SRS) document verification - Source Code Reviews- User Document Verification

Unit III Software Testing Activities

Software Testing Activities, Models and Metrics: Levels of testing- Debugging - Software test plan -Software Testing Tools- Software Metrics- Categories of Metrics

Unit IV Regression Testing

Test cases and Use cases: Use case diagram and use cases- Generation of test cases from use Cases - Guidelines for generating validity checks - Database Testing- Regression testing - Test cases -Reducing the number of test cases

Unit V Testing Methods

Object oriented Testing and Testing the Web: Path Testing - State Based Testing - Class Testing- Web Testing- Functional Testing- User Interface Testing- Usability Testing - Configuration and Compatibility Testing - Security Testing - Performance Testing



Text Book

- 1 SinghYogesh,(2012) “Software Testing”,(1st Edn), Cambridge press.

References

- 1 Mathur P Aditya,(2008),“Foundations of Software Testing”,(1st Edn) Pearson Education.
- 2 Glenford J. Myers, Corey Sandler,(2011), “The Art of Software Testing”, (1st Edn), Wiley.



204DA1ASSB	DECISION SUPPORT SYSTEMS	SEMESTER III
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Total Credit: 1

Syllabus

Unit I Introduction

Introduction - Evolution of Decision Support Systems(DSS)- Benefits -Users- Decision -Decision process- Types of Decisions- Business Decisions-Information Systems- DSS as Information systems - Models.

Unit II Decision Support Systems

DSS Hierarchy : Overview - DSS Types -DSS Architecture -DSS Client/Server Computing - The Internet and Client / Server Computing in DSS

Unit III Software Tools

Software Categories - Standard packages - Specialized Tools and Generators- Programming Languages for DSS -DSS User Interfaces

Unit IV Group DSS

Group DSS : Need for Group DSS - Group Vs Individual Activities - Types- Groupware- Group DSS in Use Today - Groupware products

Unit V Building and Implementation

Decision Support System Development Process - DSS Development Project Participants - The Implementation stage - Implementation Issues - Ethical Issues in DSS Implementation.



Text Book

- 1 Efreem G. Mallach,(2002),"Decision Support and Data Warehouse Systems",(1st Edn.),Tata Mcgraw Hill Publishers.

References

- 1 Marakas, G.M.,(2009),"Decision Support Systems in the 21st century", (2nd Edn), PHI Learning
- 2 Taylor, J.,(2011),"Decision Management Systems: A Practical Guide to Using Business Rules and Predictive Analytics", IBM Press



Course Code	Course Name	Category	L	T	P	Credit
194DA1A4CA	JAVA PROGRAMMING	CORE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Concepts of Java Programming
- Implement object-oriented design with Java
- Java Utilities, Packages and Applets

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Gain Knowledge about basic concepts of Java	K1
CO2	Understand the fundamentals of object-oriented programming in Java	K2
CO3	Construct Arrays , Packages and Interfaces	K5
CO4	Apply the concepts of exception handling, multithreading and Files	K3
CO5	Develop interactive programs using applets and graphics	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	L
CO2	S	M	S	M	L
CO3	S	M	S	M	L
CO4	S	S	S	S	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



194DA1A4CA	JAVA PROGRAMMING	SEMESTER IV
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Java Basics 10 h

Java Evolution: History - Features - Overview of Java Language: Introduction - Simple Java program - Java program structure - Java tokens - Java statements - Java Virtual Machine - Command Line Arguments- Data Types - Variables - Symbolic Constants - Operators and Expressions

Unit II Classes, Objects and Decision making 12 h

Introduction-If statements - Nesting of If...Else statements - The Else... If ladder - Switch statement - Conditional operator - Looping : Introduction - While statement - Do statement - For statement - Jumps in loops - Labeled loops - Classes - Objects - Methods

Unit III Arrays, Interfaces and Packages 12 h

One dimensional arrays- Two dimensional arrays - Strings - Vectors - Wrapper classes-Enumerated types - Annotations - Interfaces: Defining interfaces - Extending Interfaces-Implementing Interfaces - Accessing Interface variables - Packages: Using system packages-Naming conventions-Creating and Using Packages

Unit IV Multithreading, Exception Handling and Files 13 h

Creating threads - Extending a thread class - Stopping and blocking a thread - Life cycle of a thread -Thread exceptions - Inter thread communication - Exception Handling -I/O Files: Introduction - Concept of Streams - Stream classes - Byte stream and character stream classes - Using streams

Unit V Applet and Graphics Programming 13 h

Building applet code-Applet life cycle-Creating an executable applet-Applet tag- Adding applet to a HTML file - Running the applet-Passing parameters to applets - HTML tags - Displaying numeric values - User input - Event handling- Graphics: Graphics Class - Lines and Rectangles - Circles and Ellipses-Drawing Arcs and Polygons - Line Graphs -Bar charts



Text Books

- 1 E.Balaguruswamy, 2014, "Programming with Java A Primer", 5th Edition, Tata McGraw Hill Publications

References

- 1 Paul Deitel and Harvey Deitel,2015,"Java How to Program",10th Edition, Deitel& Associates Inc Publications
- 2 Herbert Schildt,2011,"JAVA-The Complete Reference",8th Edition Tata McGraw Hill Publications,



Course Code	Course Name	Category	L	T	P	Credit
194DA1A4CB	OPERATING SYSTEMS	CORE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Basic Concepts and Principles of Operating Systems
- Concepts of CPU Scheduling and Process Management
- Concepts of Memory and Storage Management

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Describe the Concepts of Operating Systems and System calls	K1
CO2	Understand Process scheduling and Synchronization concepts	K2
CO3	Understand CPU Scheduling and Handling of Dead locks	K2
CO4	Analyze memory management and allocation policies	K4
CO5	Identify the usage of storage management	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	L
CO2	S	S	S	M	L
CO3	S	S	M	M	M
CO4	S	S	S	S	M
CO5	S	S	M	S	M

S Strong

M Medium

L Low



194DA1A4CB	OPERATING SYSTEMS	SEMESTER IV
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Operating Systems 10 h

Introduction – Operating System Structure and Operations - Process Management - Memory Management - Storage Management - Protection and Security - Operating-System Services - User and Operating System Interface - System Calls - Types of System Calls - System Programs- Operating System Design and Implementation

Unit II Process Scheduling and Synchronization 12 h

Process Concept - Process Scheduling - Operations on Processes - Interprocess Communication- Communication in Client-Server Systems - Threads: Overview - Multicore Programming- Multithreading Models - Thread Libraries - Implicit Threading - Threading Issues - The Critical-Section Problem - Peterson’s Solution - Synchronization Hardware - Mutex Locks - Semaphores

Unit III CPU Scheduling and Deadlocks 13 h

Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Thread Scheduling - Multiple-Processor Scheduling - Real-Time CPU Scheduling - Deadlocks: System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention -Deadlock Avoidance-Deadlock Detection - Recovery from Deadlock

Unit IV Memory Management 12 h

Main Memory: Background - Swapping - Contiguous Memory Allocation - Segmentation - Paging- Structure of the Page Table- Virtual Memory: Background - Demand Paging - Copy-on-Write- Page Replacement - Allocation of Frames - Thrashing – Memory-Mapped Files

Unit V Storage Management 13 h

Overview of Mass Storage Structure - Disk Structure - Disk Attachment - Disk Scheduling - Disk Management - Swap-Space Management - File Concept - Access Methods - File-System Mounting - File Sharing – Protection - File-System Structure - Case Study: Linux



Text Books

- 1 Silberschatz, Galvin, Gagne, 2013, "Operating System Concepts", 9th Edition, John Wiley & Sons

References

- 1 H.M. Deitel, P. J. Deitel and D. R. Choffnes, "Operating Systems", 2004, 3rd Edition, Pearson Education Publication
- 2 Achyut S.Godbole, "Operating Systems",2011, 3rd Edition, Tata McGraw Hill Publications



Course Code	Course Name	Category	L	T	P	Credit
192MT1A4IF	DISCRETE MATHEMATICS	IDC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Concept of mathematical and logical operators
- Difference between relation and function
- Concepts of Boolean algebra and graph theory

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Discuss the Mathematical logical operators	K2
CO2	Explain the concept of relation and function	K3
CO3	Apply the application of Lattices through Boolean functions	K3
CO4	Apply the concept of Graphs in the construction of Trees	K3
CO5	Construct the finite state machines for various languages	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	M	S
CO4	S	S	S	S	S
CO5	S	M	S	S	S

S Strong

M Medium

L Low



192MT1A4IF	DISCRETE MATHEMATICS	SEMESTER IV
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Mathematical Logic 10 h

Statements and notation - Connectives - Statement formulas and truth tables - Logical capabilities conditional and biconditional - well-formed formulas - tautologies - equivalence of formulas - duality law - tautological implications - formulas with distinct truth tables - functionally complete sets of connectives - Other connectives - Normal forms.

Unit II Relations and Functions 10 h

Relations and ordering - Relations - properties - relation matrix and the graph of a relation - partition and covering of a set - equivalence relations - compatibility Relations - Composition - Partial ordering - Representation and associated terminology- functions -composition of functions - inverse functions - binary and n-ary operations - characteristic function of a set - Hashing functions.

Unit III Lattices and Boolean Algebra 10 h

Lattices as partially ordered sets - properties- lattices as algebraic systems - sublattices, direct product and Homomorphism -special lattices - Subalgebra direct product and Homomorphism - Boolean function - Boolean forms and free Boolean algebras - Values of Boolean expression and Boolean functions - Representation and Minimization of Boolean functions.

Unit IV Graph Theory 8 h

Basic concept of graph theory - Paths, reachability and connectedness - Matrix representation - Trees - storage representation and manipulation of graphs.

Unit V Grammars and Languages 10 h

Discussion of grammar - formal definition of a Language - notions of syntax analysis - Finite state Machines - introductory sequential circuits - equivalence of finite state machines - finite state acceptors and regular grammars.

Note:Theory 20% and problem 80%



Text Books

- 1 Tremblay J.P and Manohar R, 2004, "Discrete Mathematics Structures with Applications to Computer Science", McGraw Hill Education, New Delhi.

References

- 1 Veerarajan T, 2006, "Discrete Mathematics with Graph Theory and Combinatorics", McGraw-Hill Education, New Delhi.
- 2 Venketaramen MK, Sridharan N, Chandarasekaran N, 2003, "Discrete Mathematics" , The National publishing Company, Chennai.
- 3 Iyengar S.N, Chandrasekaran V.M. Venkatesh. K.A and Arunachalam P.S., 2003, "Discrete Mathematics ", Vikas Publishing House Pvt. Limited, New Delhi.
- 4 Babu Ram, 2010, "Discrete Mathematics" , Pearson Education , New Delhi



194DA1A4CP	CORE PRACTICAL: JAVA PROGRAMMING	SEMESTER IV
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Total Credits: 2

Total Instructions Hours: 48h

S.No

List of Experiments

- 1 Program to practice Operators, Precedence and Data types
- 2 Program to implement classes, objects, methods and constructors
- 3 Program to implement command line arguments
- 4 Program to demonstrate types of exception handling
- 5 Program to implement the concept of Threading
- 6 Program to perform string manipulation functions
- 7 Program to illustrate access modifiers
- 8 Program to count the number of characters, words and lines in a text file
- 9 Program to draw different shapes in an Applet window
- 10 Program to perform mouse click operations

Note: Out of 10 - 8 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
204DA1A4SA	DATA MINING	SEC	3	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Basic concepts of Data Mining
- Data Mining Techniques
- Applications and Recent trends in Data Mining

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of data mining	K2
CO2	Deploy appropriate classification techniques for data mining	K2
CO3	Apply association rules for mining data	K3
CO4	Examine similarity and distance measures in clustering	K3
CO5	Examine data mining applications and recent trends	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	S	S	S	M
CO3	S	S	S	M	M
CO4	S	S	S	M	M
CO5	M	M	M	S	S

S Strong

M Medium

L Low



204DA1A4SA	DATA MINING	SEMESTER IV
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 8 h

Introduction to Data Mining: Origins of Data Mining - Data Mining Tasks - Data: Attributes and Measurement - Types of Data sets - Data Mining Issues - Data Quality - Data Preprocessing - Measures of Similarity and Distance Measures - Proximity measures

Unit II Classification 10 h

Classification: Introduction - Statistical Based Algorithms: Regression - Bayesian Classifications - Distance Based Algorithms: K Nearest Neighbors - Decision Tree Based Algorithms

Unit III Associations 10 h

Association Rules - Introduction - Large Itemsets - Apriori Algorithm - Sampling algorithm - Advanced Association Rule Techniques: Generalized Association Rule - Multi Level Association Rules - Quantitative Association Rules.

Unit IV Clustering 10 h

Similarity and Distance Measures - Outliers - Hierarchical Algorithms : Agglomerative - Divisive Clustering - K means Clustering - Nearest Neighbor Algorithm

Unit V Applications and Trends 10 h

Web Mining - Web Content Mining - Structure and Usage Mining - Spatial Mining - Time Series and Sequence Mining - Temporal Association Rules.



Text Books

- 1 Vipin Kumar, Pang-Ning Tan Michael Steinbach (2006), “Introduction to Data Mining”, Addison Wesley(Unit 1)
- 2 Margaret H. Dunham, (2003), “Data Mining : Introductory and Advanced Topics”, (1st Edn.), Pearson Education (Unit II-V)

References

- 1 Arun.K.Pujari, (2013)"Data Mining Techniques", (3rd Edn.),University Press (India) Limited
- 2 Jiawei Han and Micheline Kamber, (2006), “Data Mining Concepts and Techniques”, (2nd Edn.),Morgan Kaufmann Publication



204DA1A4SP	SEC PRACTICAL: DATA MINING	SEMESTER IV
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Total Credits: 2

Total Instructions Hours: 48h

S.No	List of Experiments
1	Demonstrate Pre-processing on the available data sets using Weka
2	Implement Pre-processing on handling missing values in datasets using Weka.
3	Implement the concept of classification in Weka
4	Implement the concept of clustering in Weka
5	Find Associated items in supermarket dataset using Weka
6	Demonstrate Normalization in Weka
7	Implement the Bayesian Classification in Weka
8	Construct a scatterplot using simple linear regression in Weka
9	Create a Decision tree for given datasets in Weka
10	Implement K Means Clustering Techniques in Weka

Note: Out of 10 – 8 Mandatory



194DA1A4GA	GENERIC ELECTIVE: INTRODUCTION TO BIG DATA	SEMESTER IV
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Data Explosion 4 h

Data: Definition - Data in digital age- Big Data: Introduction - Search Engine Data - Healthcare Data - Social Media Data - E-Commerce Data - Media and Entertainment Data - Real-time Data - Astronomical Data

Unit II Big Data 4 h

Definition - Big Data Vs Small Data - The Five V's: Volume - Velocity - Variety - Veracity - Value - Mining Big Data : Clustering - Classification - Decision Tree for Transactions - Data Visualization

Unit III Big Data Analytics 6 h

Big Data Analytics: Introduction - Tools for Data Analytics - Hadoop: Features - Hadoop Architecture - Hadoop Distributed File System - MapReduce - Map Function - Shuffle and Reduce Functions - Advantages

Unit IV Big Data Storage 6 h

Introduction-Moore's Law- ACID Properties- Storing Structured Data - Storing Un-Structured Data: Relational Database Management Systems - NoSQL databases for big data- Types of No-SQL Databases : Document Oriented - Columnar - Graph - Key-Value Pair

Unit V Applications 4 h

Application of Big Data : Healthcare - Advertising : Pay per click advertising- Targeted advertising - Recommender Systems - Big Data in Society: Smart Vehicle-Smart Homes - Smart Cities

Text Books

- 1 Dawn E. Holmes, 2017, "Big Data: A Very Short Introduction",1st Edition, Oxford

191TL1A4AA	பகுதி - 4 : அடிப்படைத்தமிழ் - தாள் : II (Basic Tamil)	SEMESTER IV
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Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019-20ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது
(10 மற்றும் 12 – ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு)
(பருவத் தேர்வு உண்டு)

அலகு : 1

12 h

நீதி நூல்கள்

- I.ஆத்திசூடி - “அறம் செய விரும்பு” முதல் “ஒளவியம் பேசேல்”வரை -12 பாடல்கள்
II.கொன்றைவேந்தன் - “அன்னையும் பிதாவும் முன்னறி தெய்வம்” முதல்
“எண்ணும் எழுத்தும் கண் எனத் தகும்” வரை -7 பாடல்கள்

III.திருக்குறள் - 6 பாடல்கள்

1. அகர முதல1
2. மனத்துக் கண்.....34
3. இனிய உளவாக100
4. தீயவை தீய பயத்தலான்.....202
5. கற்க கசடற391
6. கண்ணொடு கண்ணினை.....1100

அலகு : 2

12 h

I. எளிய நீதிக்கதைகளும் வாழ்க்கை முறைகளும்

1. நீதிகாத்த மன்னன்
2. சிங்கமும் முயலும்
3. புத்திசாலி உழவனும் போக்கிரிப் பூதமும்
4. தேனீயும் புறாவும்
5. முயல் கூறிய தீர்ப்பு

II. தமிழகப் பண்பாடுகள்

1. தமிழர் விழாக்கள் - பொங்கல், ஆடிப்பெருக்கு
2. தமிழர் கலைகள் - தெருக்கூத்து, ஓவியம், சிற்பம்
3. தமிழர் விளையாட்டுகள்- ஏறுதழுவுதல், சடுகுடு



III . பயிற்சிப் பகுதி

1. படத்திற்கு ஏற்ற சொற்களை எழுதுதல்.
2. சொற்களைத் தொடராக்குதல்.
3. பொருத்துதல்,
4. உரையாடல் பகுதி

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி - அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி - ஆ

சரியா? தவறா? தேர்ந்தெடுத்து எழுதுக . 10x2=20

பகுதி - இ

ஒரு பக்க அளவில் விடையளிக்க 03x20=60

குறிப்பு:

- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ -க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அந்தந்த அலகுகளில் அமைதல் வேண்டும்

Text Books

- 1 அடிப்படைத்தமிழ் - 20-21. தொகுப்பு : தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக ஹவுஸ்(பி)லிட். சென்னை-600 098

References

- 1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம்
- 2 வலைதள முகவரி : <http://tamilvu.org>



191TL1A4AB	பகுதி - 4 : சிறப்புத்தமிழ் - தாள் : II (Advanced Tamil)	SEMESTER - IV
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Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019- 2020 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது
(10 மற்றும் 12 - ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது
(பருவத் தேர்வு உண்டு)

அலகு - 1

05 h

திருக்குறள்

I அறத்துப்பால்

1. இனியவை கூறல் - அதிகார எண் : 10
2. அடக்கமுடைமை - அதிகார எண் : 13

II பொருட்பால்

1. கல்வி - அதிகார எண் : 40
2. உழவு - அதிகார எண் : 104

III இன்பத்துப்பால்

1. தகையணங்குறுத்தல் - அதிகார எண் : 109
2. பிரிவாற்றாமை - அதிகார எண் : 116

அலகு - 2

05 h

கட்டுரைத் தொகுப்பு

I நல்வாழ்வு - டாக்டர் மு.வரதராசன்

1. நம்பிக்கை
2. புலனடக்கம்
3. பண்பாடு

II இளைஞர்களின் ஒளிமயமான எதிர்காலத்திற்கு - கு.வெ. பாலசுப்பிரமணியம்

1. காலக்கணக்கு
2. நற்பழக்கமே செல்வம்

அலகு - 3

05 h

I காப்பியங்கள் - குறிப்பு எழுதுதல்

1. சிலப்பதிகாரம்
2. மணிமேகலை
3. கம்பராமாயணம்
4. பெரியபுராணம்



II ஊடகம் - காட்சி ஊடகங்கள்

1. தொலைக்காட்சி
2. திரைப்படம்
3. இணையம்
4. முகநூல்
5. கீச்சகம்
6. கட்செவி அஞ்சல்

அலகு - 4

05 h

இலக்கணம் - வழக்கறிதல்

1. இயல்பு வழக்கு
2. தகுதி வழக்கு

அலகு - 5

04 h

I படைப்பாற்றல் பகுதி

கவிதை,கட்டுரை எழுதச்செய்தல் - பொதுத் தலைப்பு

II பயிற்சிப் பகுதி

தமிழில் தட்டச்சு செய்தல் - யூனிகோடு எழுத்துருவில்.

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி -அ

சரியான விடையைத் தேர்வு செய்தல்

10x2=20

பகுதி -ஆ

கோடிட்ட இடங்களை நிரப்புக

10x2=20

பகுதி -இ

இரண்டு பக்க அளவில் விடையளிக்க

4x15=60

குறிப்பு :

- அனைத்து அலகுகளில் இருந்தும் இரண்டு வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ -க்கான வினாக்கள் இது அல்லது அது என்ற வகையில் அந்தந்த அலகுகளிலிருந்து அமைதல் வேண்டும்.



Text Books

- 1 சிறப்புத்தமிழ் 20-21. தொகுப்பு : தமிழ்த் துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி) லிட். சென்னை- 600 098

References

- 1 பேராசிரியர் புலவர் சோம . இளவரசு, எட்டாம் பதிப்பு - 2014, தமிழ் இலக்கிய வரலாறு - மணிவாசகர் பதிப்பகம், சென்னை - 600 108.
- 2 பேராசிரியர் முனைவர் பாக்கியமேரி , முதற் பதிப்பு- 2013, இலக்கணம் - இலக்கிய வரலாறு - மொழித்திறன் -பூவேந்தன் பதிப்பகம், சென்னை-600 004.
- 3 வலைதள முகவரி : <http://tamilvu.org>



192PY1A4AA	AECC : GENERAL AWARENESS	SEMESTER IV
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Total Credits: 2
Total Instructions Hours: 24 h

S.No	Contents
1	Current Events
2	General Science
3	Geography of India
4	Tamil and Other Literature
5	Inventions and Discoveries
6	Numerical and Mental Aptitude
7	Verbal and Non Verbal Reasoning
8	Socio- Culture and Heritage of India
9	Indian Economy and Political System
10	History of India and Freedom Struggle

References

- 1 Majid Hussain, Arora N D, 2019, "General Studies -TNPSC Group -I ", G.K.Publications (P) Ltd. New Delhi
- 2 Aggarwal R S, 2014, "Verbal and Non Verbal Reasoning" S Chand & Company, New Delhi
- 3 Competition Success Review, Competitive Success Publisher, New Delhi
- 4 Pratiyogita Darpan, Pratiyogita Darpan Publishers, Agra.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A5CA	SOFTWARE ENGINEERING	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Software Process models.
- Phases of software development.
- Unified Modeling Language

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand software process models.	K2
CO2	Describe requirement elicitation methods	K3
CO3	Discuss software processes design techniques	K5
CO4	Analyze Testing Techniques.	K4
CO5	Design using UML diagrams..	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	M
CO2	S	M	S	M	M
CO3	S	M	S	M	S
CO4	M	S	S	M	M
CO5	M	M	S	S	M

S Strong

M Medium

L Low



194DA1A5CA	SOFTWARE ENGINEERING	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Process Models 8 h

Introduction to software Engineering- Software Process- Process Models : Prescriptive Process Models - The Waterfall Model - Incremental Model - Evolutionary Process Model - Concurrent Models - Agile Methodology

Unit II Requirement Modeling 10 h

Requirement Engineering - Establishing the groundwork - Identifying Stakeholders - Recognizing multiple viewpoints- Working toward Collaboration - Eliciting requirements - Collaborative requirement gathering- Quality function Deployment- Usage Scenario Elicitation Work Products - Developing Use Cases- Building the requirements model - Elements of the requirements Model- Analysis pattern - Negotiating requirements- Validating requirement

Unit III Software Design 10 h

Design process - Software quality guidelines and attributes- Evolution of software design - Design concepts -The Design Model - Data Design elements- Architectural Design Elements- Interface Design Elements- Component Level Design Elements- Deployment level Design Elements- Architectural Design: Software Architecture-Architectural Styles

Unit IV Software Testing 10 h

A Strategic approach to testing: Verification and Validation- Software testing strategy -Test strategies for conventional software: Unit testing - Integration testing- Validation testing- White- box testing- Basic path testing- Control structure testing - Condition testing- Data flow testing - Loop testing- Black-box testing - Test strategies for Object Oriented software- Software Maintenance

Unit V UML 10 h

UML: Introduction - Modeling Concepts and Diagrams - Use Case Diagrams - Class Diagrams - Interaction Diagrams - State Chart Diagrams - Activity Diagrams - Package Diagrams - Component Diagrams - Deployment Diagrams



Text Books

- 1 Roger. S. Pressman, (2015), "Software Engineering A Practitioner's Approach", (8th Edn.), Tata McGraw Hill(Unit I-IV).
- 2 Grady Booch, Ivar Jacobson & Jim Rumbaugh, (2012), "UML Distilled", (3rd Edn.), Addison Wesley(Unit V)

References

- 1 Shari Lawrence Pfleeger, (2017), "Software Engineering Theory and Practice", Pearson Education.
- 2 Ian Sommerville, (2012), "Software Engineering", Pearson Addison Wesley.



Course Code	Course Name	Category	L	T	P	Credit
204DA1A5CB	BIG DATA TECHNOLOGIES	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The technologies of Hadoop and Spark that form the foundations of Big Data
- The concepts of MapReduce programming to process big data
- The various approaches facilitating data analytics on huge datasets

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand about accessing, storing and manipulating huge data from different resources	K2
CO2	Understand the working environment of Hadoop and Spark for processing data	K2
CO3	Apply Mapreduce programming model to process big data	K3
CO4	Analyze Hadoop, Spark and its uses for big data processing	K4
CO5	Design programs for big data applications using Hadoop and Spark components	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	S	S	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



204DA1A5CB	BIG DATA TECHNOLOGIES	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Big Data 10 h

Big Data: Introduction - Definition - Big Data Vs Small Data - The Five V's- Mining Big Data: Clustering - Classification - Decision Tree for Transactions - Data Visualization. Application of Big Data : Healthcare - Advertising : Pay per click advertising-Targeted advertising- Recommender Systems - Big Data in Society: Smart Vehicle-Smart Homes - Smart Cities

Unit II Big Data Analytics 10 h

Big Data Analytics: Introduction - Tools for Data Analytics - Hadoop: Features - Hadoop Architecture - Hadoop Distributed File System - MapReduce - Map Function - Shuffle and Reduce Functions - Advantages

Unit III Big Data Storage 10 h

Introduction-Moore's Law- ACID Properties- Storing Structured Data - Storing Un-Structured Data: Relational Database Management Systems - NoSQL databases for big data- Types of No-SQL Databases : Document Oriented - Columnar - Graph - Key-Value Pair

Unit IV Spark 10 h

Overview of Spark- Spark Architecture - Spark Toolset - Structured API- Structured Spark types- API Execution -Basic structured operations: Schemas- Columns and expressions- Records - Dataframe transformations. Working with Different types of Data- Aggregations - Grouping- Joins

Unit V Spark SQL 8 h

Spark SQL - Running Spark SQL Queries -Tables -Views - Databases - Complex Types -Functions - subqueries - Dataset: Actions - Transformations- Joins - Grouping and Aggregation - Resilient Distributed Datasets(RDD) - Types -Creation - Transformations - Actions



Text Books

- 1 Dawn E. Holmes, 2017, “Big Data: A Very Short Introduction”, 1st Edition, Oxford (Unit I - III)
- 2 Bill Chambers and Matei Zaharia,(2018), “Spark: The Definitive Guide”, O’Reilly Media (Unit IV,V)

References

- 1 Jules.S.,Brooke Wenig,Tathagata Das& Denny Lee, (2020),”Learning Spark”, O’Reilly Media.
- 2 Holden Karau & Rachel Warren, (2017),”High Performance Spark”, O’Reilly Media.



Course Code	Course Name	Category	L	T	P	Credit
204DA1A5CA	ARTIFICIAL INTELLIGENCE	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Fundamental concepts of Artificial Intelligence
- About basic Principles ,Techniques and Applications
- Concepts of Problem solving

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Discuss the History and Foundations of Artificial Intelligence	K2
CO2	Apply the Problems in Searching Techniques	K3
CO3	Use the Informed Search strategies	K3
CO4	Demonstrate the Constraint Satisfaction Problem and Adversarial Search	K3
CO5	Analyze the Knowledge representation and Reasoning	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	S	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	S

S Strong

M Medium

L Low



204DA1A5CA	ARTIFICIAL INTELLIGENCE	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 9 h

Artificial Intelligence: Foundations - History - State of the Art - Intelligent Agents: Agents and Environments -The concept of Rationality - The Nature of Environments - The Structure of Agents :Agent Programs - Simple reflex Agents - Model Based reflex Agents - Goal Based Agents - Utility based Agents - Learning Agents

Unit II Solving Problems by searching 10 h

Problem Solving Agents - Example Problems :Toy Problems - Real world Problems - Searching for Solutions - Uninformed Search Strategies : Breadth-First Search - Depth-First Search - Depth Limited Search - Iterative Deepening Depth first search - Bidirectional Search - Comparing Uninformed Search Strategies

Unit III Informed Search 10 h

Informed Search Strategies : Greedy Best First Search - A* Search - Memory Bounded Heuristic Search - Local Search Algorithms: Hill-Climbing Search - Simulated Annealing Search - Local Beam Search - Genetic Algorithms- Online Search Agents : Online Search Problems- Online local Search

Unit IV Constraint Satisfaction Problem(CSP) and Adversarial Search 10 h

Constraint Satisfaction Problem - Backtracking search for CSP's:Cryptarithmic Problem- Graph Coloring - Local Search for Constraint Satisfaction Problem- Structure of Problems - Adversarial Search: Games -Optimal Decision in Games: Optimal Strategies - The Minmax Algorithm - Alpha-Beta Pruning -Imperfect - Real Time Decision: Evaluation Function - Cutting off Search

Unit V Knowledge and Reasoning 9 h

Logical Agents - Knowledge Based Agents - Logic - Propositional Logic: Syntax - Semantics - Inference -Equivalence, Validity and Satisfiability - Reasoning Patterns in Propositional Logic - First Order Logic : Syntax and Semantics of FOL - Using FOL



Text Books

- 1 Stuart.Russell, Peter.Norvig, (2020), “Artificial Intelligence-A Modern Approach”, (3rd Edn.),Prentice Hall.

References

- 1 Nilsson, N.J. (2011), “Artificial Intelligence and New Systems”, (1st Edn.), Elsevier.
- 2 Patterson, D.W. (2012), “Introduction to Artificial Intelligence and Expert Systems”, Prentice Hall of India.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A5CD	WEB DESIGNING	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The principles of webpage design
- Interactive webpages
- Scripting languages

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand concepts of web design	K2
CO2	Design applications using java script.	K3
CO3	Develop dynamic webpages using DHTML..	K3
CO4	Understand the concepts of PHP.	K4
CO5	Construct web applications.	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	M
CO2	S	M	S	M	M
CO3	S	M	S	M	S
CO4	M	S	S	M	S
CO5	S	M	S	S	M

S Strong

M Medium

L Low



194DA1A5CD	WEB DESIGNING	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Internet Basics and HTML 10 h

Basic Concepts - Internet Domains - Internet Server Identities - IP Address - Transmission Control Protocol(TCP) - File Transfer Protocol(FTP) - Telecommunication Network (TELNET)- Hyper Text Markup Language (HTML): Introduction - Lists - Adding Graphics to HTML Document - Tables - Linking Documents - Frames

Unit II Java Script 10 h

Java Script in Web Pages - Advantages of Java Scripts - Writing Java Scripts in to HTML - Basic Programming Techniques - Operators and Expression in Java Scripts - Java Scripts Programming constructs - Conditional Checking - Super Controlled Endless Loop -Functions in Java Scripts - User Defined Functions - Placing Text in a Browser - Dialog Boxes- Java Script Document Object Model (DOM)

Unit III Dynamic HTML 8 h

Dynamic HTML - Cascading Style Sheets(CSS) - Font Attributes - Color and Background Attributes - Text Attributes - Border Attributes - List Attributes - Class - DHTML and Java Scripts - Java Scripts and HTML Events - Java Scripts and HTML DOM-Text Script

Unit IV Hypertext Preprocessor (PHP) 10 h

Introduction to PHP - PHP and HTML - The Basics of PHP: Data types - Constants - Here Documents - Operators - Arrays - conditional Statements - Iterations -Functions: User Defined functions - Built-in Functions - Working with Date and Time - Performing Mathematical Operations - Working with String Functions



Unit V PHP Forms and Debugging 10 h

HTML form Tags and Elements -Form elements: Text Box - Text Area -Password - Radio Button -Check Box - The Combo Box - Hidden Field - Image - Submit and Reset Buttons - Adding Elements to a Form -Uploading Files to the Web Server Using PHP- Debugging and Error Handling

Text Books

- 1 Ivan Bayross,(2010), "Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", (4th Edn.), BPB Publications.

References

- 1 Thomas A. Powel, (2017), "Web Design - The Complete Reference", (5th Edn.), TMH Publications.
- 2 Rajkamal, (2012), "Internet and web technologies", (4th Edn.), TMH Publications.



204DA1A5CP	CORE PRACTICAL: BIG DATA TECHNOLOGIES	SEMESTER V
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Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Implement Hadoop file management tasks like adding files and directories, retrieving files, deleting file
2	Implement the Pig Latin scripts to group and join
3	Implement the Pig Latin scripts to sort and filter data
4	Implement Hive Scripts to create, alter, drop databases and tables
5	Implement Hive Scripts to create views, functions and indexes
6	Create Resilient Distributed datasets (RDD) and perform transformations like filter and sort
7	Create RDD and perform RDD transformations like sample and Union
8	Create Spark dataframe from RDD and perform update, drop, filter functions
9	Perform pivoting in Spark dataframe
10	Load a CSV file into Spark RDD and read the contents

Note: Out of 10 - 8 mandatory



194DA1A5CQ	CORE PRACTICAL: WEB DESIGNING	SEMESTER V
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Total Credits: 2

Total Instructions Hours: 48 h

S.No	Contents
1	Create a HTML Document using Basic HTML Tags.
2	Create a HTML Document using list Attributes.
3	Create a HTML Document to display a class timetable using <table> tag.
4	Create a HTML Document to display Mouse over effect on images using CSS.
5	Create a Web Page Containing a clock using Java Script.
6	Create a Web Page to display an Order form using JavaScript and DHTML.
7	Create a Web Page to validate a form using JavaScript.
8	Create a CGPA Calculator in Web Browser using HTML,CSS, JavaScript
9	Create a file and write data in to the file using PHP.
10	Create a file and upload using PHP and Scripts.

Note: Out of 10 – 8 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
204DA1A5DA	INTERNET OF THINGS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The various IoT-related protocols
- IoT infrastructure for real time applications
- Data analytics context of IoT

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know about the foundations of IoT and its challenges	K2
CO2	Understand about IoT Architectures	K2
CO3	Apply IoT in Smart Objects	K3
CO4	Explain about data analytics for IoT and Security	K5
CO5	Relate IoT infrastructure for real time applications	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	S	S	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



204DA1A5DA	INTERNET OF THINGS	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 8 h

Introduction of IoT - Genesis of IoT - IoT and Digitization - IoT Impact - Convergence of IT and OT - IoT Challenges - IoT Network Architecture and Design - Scale - Security - Constrained Devices and Networks - Data - Legacy Device Support

Unit II Architectures 10 h

IoT Architectures: oneM2M(Machine to Machine) IoT Standardized Architecture - IoT World Forum (IoTWF) Standardized Architecture - Core IoT Functional Stack - IoT Network management Sub layer - IoT Data Management and Functional Stack - Fog computing - Edge Computing

Unit III Smart Objects in IoT 10 h

Sensors - Actuators - Smart Objects : Definition - Trends in Smart Objects - Sensor Network : Wireless Sensor Networks. Connecting smart objects: Communications Criteria - Range - Frequency - Power Consumption- Topology - Constrained Devices - Constrained Node Networks - Data rate, Throughput ,Latency

Unit IV Data Analytics for IoT and Security 10 h

Introduction: Structured Versus Unstructured Data - Data in Motion Versus Data at Rest - IoT Data Analytics - IoT Data Analytics Challenges - Security : Security Frameworks for IoT - Privacy in IoT networks - IoT Characteristics and reliability - Addressing reliability

Unit V Applications 10 h

Introduction : Sensors -Gateway - The Gateway: Hardware - Software - Internet of Vehicles(IoV) : Basics of IoV - Characteristics and Challenges - Enabling Technologies - Cloud Based Smart facilities and Management - Architecture for smart facility management



Course Code	Course Name	Category	L	T	P	Credit
204DA1A5DB	BIO INFORMATICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The Fundamentals of bioinformatics
- Sequence Analysis
- Functional and Structural Sequence Elements

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the biochemistry, Cell, and Molecular Biology	K2
CO2	Understand the Molecular Genetics	K2
CO3	Understand the Managing Bioinformatics Tools in Unix Operating system	K2
CO4	Understand the Management and Analysis of DNA Sequences	K2
CO5	Analyze the Functional and Structural Sequence Elements	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	M	M	M
CO5	S	S	M	M	S

S Strong

M Medium

L Low



204DA1A5DB	BIO INFORMATICS	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Biochemistry, Cell, and Molecular Biology 8 h

The Cell: Nucleic Acids and Proteins: Modern Linguistics for the Genomics and Bioinformatics Era - Structure and Function of Cell Organelle - Cell Signaling. Transcription and Translation: DNA Replication, Repair and Recombination - Transcription - RNA Processing and Translation

Unit II Molecular Genetics: 10 h

Genomics: Epigenetic Mechanisms Regulating Gene Expression - Gene Families and Evolution - Repetitive DNA: Detection - Annotation and Analysis.

Unit III Bioinformatics Tools 10 h

Managing Bioinformatics Tools: Management of a Server-Based Bioinformatics Resource - Command Line Sequence Analysis: GCG File Management - GCG Sequence Analysis

Unit IV Computer Applications: 10 h

Management and Analysis of DNA Sequencing Projects and Sequences: Managing Sequencing Projects in the GAP4 Environment - The Genome Database: Analysis and Similarity Searching: Ensemble: An Open-Source Software Tool for Large-Scale Genome Analysis - Sequence Similarity and Database Searching

Unit V Identifying Functional and Structural Sequence Elements: 10 h

Pattern Discovery: Methods and Software - The Role of Transcription Factor Binding Sites in Promoters and Their In Silico Detection - An Introduction to Multiple Sequence Alignment and Analysis - 3D Molecular Visualization with Protein Explorer



Text Books

- 1 Stephen A. Krawetz and David D. Womble, "Introduction to Bioinformatics: A Theoretical and Practical Approach", Humana Press, Totowa, New Jersey

References

- 1 R.Durbin, S.Eddy, A.Krogh, G.Mitchison, (2002)," Biological Sequence Analysis Probabilistic Models of proteins and nucleic acids", Cambridge University Press.
- 2 David W. Mount, (2004), "Bioinformatics Sequence and Genome Analysis", (2nd Edn.), Cold Spring Harbor Laboratory Press.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A5DC	SOCIAL MEDIA ANALYTICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Evolution of Social Media
- Model and Visualize the Social Media
- Component of the social media

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the foundations of Social Media	K2
CO2	Analyze the Components used in Social Media	K4
CO3	Analyse Social Media Dashboards, Metrics and Reports.	K3
CO4	Describe the behavior of the user in social network	K1
CO5	Predict the outcomes of the social network	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S Strong

M Medium

L Low



194DA1A5DC	SOCIAL MEDIA ANALYTICS	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Social Media Data 9 h

Foundation of Analytics - Evolution of Data - Social Media Data Sources: Offline and Online - Defining Social Media Data - Data Sources into Social Media Channels - Estimated Vs Factual Data Sources - Public and Private Data - Data Gathering in Social Media Analytics - Application Programming Interface - Web Scraping or Crawling

Unit II Analytics in Social Media 10 h

Types of Analytics in Social Media - Social Media Listening: Keywords and Mention based Analysis - Advertising Analytics - Content Management Systems Analytics - Customer Relationship Management Analytics - Dedicated Vs Hybrid Tools - Advantages of Dedicated Tools -Hybrid Tools: Dedicated Tools with Hybrid Features - Advantages and Disadvantages of Hybrid Tools - Data Integration Tools

Unit III Metrics , Dashboards and Reports 10 h

Default and Custom metrics - Metric Categories :Divide and Conquer - Graph Types - Metrics and Strategy - Dealing with Complex and Subjective questions - Metric and Tactics - Dashboards: Defining Dashboard Objectives - Default Vs Custom Dashboards - Data integration Dashboard - Reports: Elements of Reporting - Element as Chain-Reporting Approaches - Goal Oriented -Story Telling Animation Effects in reporting-Reporting with Team

Unit IV Analyzing the Social Network-Facebook 10 h

Accessing the Facebook: Understanding the Graph API - Understanding the Netvizz - Data Access Challenge - Analyzing the Personal Social Network: Basic Descriptive Statistics - Analyzing the Mutual Interests - Build the friend network graph - Analyzing the Node Properties -Analyzing the network communities



Unit V Social Coding with GitHub 9 h

Environment Setup - Understanding the GitHub - Accessing GitHub Data - Registering an application in GitHub- Accessing the Data using the GitHub API - Analysis the repository Activities :Analyzing weekly commit frequency - Analyzing commit frequency distribution versus day of the week - Daily commit frequency - weekly code modification history - trending repository

Text Books

- 1 Alex GonCalves, (2017), "Social Media Analytics Strategy Using Data to Optimize Business Performance", (1st Edn.), Apress.(Unit I-III).
- 2 Raghav Bali, Dipanjan Sarkar, Tushar Sharma, (2017), "Learning Social Media Analytics with R", (1st Edn.), Packt Publisher(Unit IV,V).

References

- 1 Marshall Sponder, (2012),"Social Media Analytics Effective Tools for Building Interpreting and using Metrics", Tata Mc Graw Hill.



Course Code	Course Name	Category	L	T	P	Credit
192MT1A5AA	RESEARCH METHODOLOGY	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The art of using different research methods and techniques
- Planning and writing of research proposals and dissertations, as well as a thesis
- The necessity for research ethics and guidelines to pursue research

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the basics of the research methods and techniques	K1
CO2	Remember the hypothesis, laws related to research problem	K1
CO3	Understand the limitations of experimentation in research	K2
CO4	Illustrate the concept of interdisciplinary and multidisciplinary research	K3
CO5	Analyze the ethics and responsibilities of research	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	M	S	S	S	S
CO3	S	S	M	S	S
CO4	S	M	M	M	M
CO5	S	S	M	M	S

S Strong

M Medium

L Low



192MT1A5AA	RESEARCH METHODOLOGY	SEMESTER V
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Research 4 h

Research: Introduction- Basic, Applied and Evaluation research – multidisciplinary and interdisciplinary Research – value of research skills – formulating a research problem – Research in relation to Teaching and Publishing

Unit II Hypotheses, Theories and Laws 6 h

Hypotheses – Theories – Laws. Scientific statements: their justification and acceptance: verification – Falsification – Acceptance – Peer review

Unit III Experimentation and research 5 h

The roles and limitations of experimentation – Experimentation and research – conducting experiments - validity and reliability in experimentation – Design of experiments

Unit IV Scientific method and Research Design 4 h

Introduction to Scientific method – Research Design - Components - research design and proposal -checklist in the preparation of proposals

Unit V Ethics and Responsibility in Scientific Research 5 h

Ethics – guidelines for Ethical practices in research - unethical to ethics in research - responsibility of Scientists and of Science as an Institution



Text Books

- 1 Perter Pruzan, (2016), Research Methodology: The Aims, Practices and Ethics of Science. Springer, Switzerland

References

- 1 Thomas, C.G. (2015) Research Methodology and Scientific Writing. Ane Books Pvt. Ltd.: New Delhi.
- 2 Locharoenrat, K. (2017) Research Methodologies for Beginners. Pan Stanford Publishing: Singapore.
- 3 Ranjit Kumar, (2014) Research Methodology: A Step-by-Step Guide for Beginners. SAGE Publications Ltd.: Singapore.
- 4 Kothari, C.R. Garg, G. (2009) Research Methodology Methods and Techniques. New Age International Publishers, New Delhi..



Course Code	Course Name	Category	L	T	P	Credit
204DA1A6CA	MACHINE LEARNING	CORE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The Fundamentals of Machine Learning
- Supervised and Unsupervised Learning algorithms used for Classification, Prediction and Clustering
- Concepts of Artificial Neural Networks and Deep Learning.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of Machine Learning	K2
CO2	Identify suitable machine learning method for an application	K2
CO3	Implement Supervised and Unsupervised learning algorithms	K3
CO4	Analyze the performance of different machine learning algorithms	K4
CO5	Develop applications to solve real world problems using appropriate machine learning technique	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	M	M	S	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	S

S Strong

M Medium

L Low



204DA1A6CA	MACHINE LEARNING	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Machine Learning 11 h

Introduction - Types of Machine Learning: Supervised, Unsupervised and Reinforcement - Applications of Machine Learning - Machine Learning Activities- Basic Types of Data in Machine Learning - Exploring Structure of Data- Data quality and Remediation- Data Pre-Processing

Unit II Feature Engineering, Modeling and Evaluation 12 h

Introduction to Feature Engineering - Feature Transformation - Feature Subset Selection - Selecting a model - Training a model : Hold Out method - K fold Cross validation Method - Model Representation and Interpretability - Evaluating Performance of the model - Improving Model Performance

Unit III Supervised Learning : Classification, Regression 12 h

Introduction to Supervised learning - Classification Model - Classification learning steps: k - nearest neighbour - Decision Trees -Random Forest Model - Support Vector Machines- Regression: Introduction - Simple Linear Regression, Multiple linear Regression, Logistic Regression

Unit IV Unsupervised Learning : Clustering, Association Rules 12 h

Introduction - Supervised Vs Unsupervised learning- Applications of Unsupervised learning - Clustering: Types of Clustering - Partitioning methods- K-Medoids - Hierarchical clustering - DBSCAN -Finding patterns using Association rule : Association rule - Apriori algorithm

Unit V Neural Networks and Deep Learning 13 h

Introduction - Exploring the Artificial Neuron - Types of Activation Functions - Architectures of Neural Networks - Learning Process in ANN - Backpropagation - Deep learning : Shortcomings of Feature Selection - Vanilla Deep neural network issues -Filters and Feature maps - Convolutional layer



Text Books

- 1 Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, (2019), “Machine Learning”, (1st Edn.), Pearson Publishers (Unit I-IV).
- 2 Nikhil Buduma,(2017), “Fundamentals of Deep Learning : Designing Next Generation Machine Intelligence Algorithms”, (1st Edn.), O’Reilly Media(Unit-V).

References

- 1 Tom M. Mitchell, (1997), “ Machine Learning”, (1st Edn.), Tata McGraw-Hill.
- 2 Suresh Samudrala, (2019), “Demystifying Machine Learning, Neural Networks and Deep learning”, (1st Edn.), Notion Press.
- 3 Christopher M. Bishop, (2007), “Pattern Recognition and Machine Learning”, (1st Edn.), Springer.



194DA1A6CP	CORE PRACTICAL : DATA VISUALIZATION	SEMESTER VI
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Total Credits: 2
Total Instructions Hours: 48h

S.No	Contents
1	Construct a tree map and create appropriate hierarchical views and explore the data and visualization.
2	Construct an Excel file and use Tableau to create a bar chart version showing the same hierarchy as your tree map, coloring it to emphasize similar results.
3	Differentiate two versions having similar functionality by adding filters.
4	Make a visualization showing the total number of calls, separated by incoming and outgoing
5	Make a visualization showing the largest number of outgoing calls.
6	Make a visualization showing the most calls at the specific time block.
7	Use the grouping function for applications (subgroup under Branch).
8	Review the data and make visualization(s) that supports downsizing the company by laying off one branch.
9	Review the data and make a visualization(s) that supports recommending one employee for employee of the month honors.
10	Make a dash board and add elements to a dashboard containing visualizations.

Note: Out of 10 – 8 Mandatory



204DA1A6CV	PROJECT WORK	SEMESTER VI
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Total Credits: 4

Total Instructional Hours 108 h

GUIDELINES:

1. A Guide has been allotted to each student by the department. Student can select any topic in discussion with the supervisor. Students should maintain a work diary where in weekly work carried out has to be written. Guide should review the work every week and put his/her signature. The work diary along with project report should be submitted at the time of viva voce.
2. CA Marks Distribution: A minimum of three reviews have to be done, one at the time finalizing the project title, second at framing questionnaire/identifying the primary data and the third review at the time of commencement of report writing. They should be asked to present the work done to the respective guide in the three reviews. The guide will give the marks for CIA as per the norms stated below:

First Review	10 Marks
Second Review	10 Marks
Third Review	10 Marks
Document, Preparation and Implementation	10 Marks
Total	40 Marks

3. End Semester Examination: The evaluation for the end semester examination should be as per the norms Given Below:

Record work and Presentation	40 Marks
Viva-Voce	20 Marks
Total	60 Marks

Note: (End Semester Examination marks jointly given by the external and internal examiner).



Course Code	Course Name	Category	L	T	P	Credit
194DA1A6DA	CLOUD COMPUTING	DSE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Basic Concepts of Cloud Computing and Services
- Cloud Computing Architectures, Applications and Challenges
- Cloud Storages and Explore File Sharing

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the Fundamentals of Cloud and its working Environment	K1
CO2	Identify the usage of cloud	K2
CO3	Understand Cloud Services	K3
CO4	Illustrate the concepts of Storage and Sharing with Communities	K5
CO5	Evaluate Web based Communication Tools in cloud	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	M
CO2	M	S	M	S	M
CO3	S	S	M	S	M
CO4	S	S	M	S	S
CO5	M	S	S	S	S

S Strong

M Medium

L Low



194DA1A6DA	CLOUD COMPUTING	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction 12 h

Cloud Computing :Introduction - From Collaboration to Cloud - Working of Cloud Computing -Advantages and Disadvantages - Benefits - Developing Cloud Services: Web Based Applications - - The Pros and Cons of Cloud Service Development - Discovering Cloud Services and Tools

Unit II Cloud Computing Usage 12 h

Centralizing Email Communications - Cloud Computing for Community - Collaborating on Schedules -Collaborating on Group Projects and Events - Cloud Computing for Corporation -Mapping Schedules- Managing the contact lists - Managing Projects - Collaborating on Reports - Collaborating on Presentations

Unit III Cloud Services 12 h

Collaborating on Calendars, Schedules and Task Management : Exploring Online Schedules Application - Exploring Online Planning and Task Management - Collaborating on Event Management - Collaborating on Project Management - Collaborating on Word Processing -Spreadsheets

Unit IV Storing and Sharing 12 h

Understanding Cloud Storage: Risks of Storing Data in the clouds -Evaluating Online File Storage and Sharing Services - Exploring online Bookmarking Services - Exploring Online Photo Editing Applications - Exploring Photo Sharing Communities -Controlling it with Web Based Desktops

Unit V Web based Communication Tools in cloud 12 h

Evaluating Web Mail Services - Evaluating Instant Messaging -Evaluating Web Conference Tools -Creating Groups on Social Networks : Creating Groups on Social Networks - Evaluating Online Groupware -Collaborating via Blogs and Wikis



Text Books

- 1 Michael Miller, (2014), "Cloud Computing", Pearson Education, New Delhi.

References

- 1 ArshdeepBahga, (2013), "Cloud Computing: A Hands-On Approach", Paperback – Import.
- 2 Anthony T. Velte, (2009), "Cloud Computing A Practical Approach", (1st Edn), Tata McGraw Hill Education Private Limited.



Course Code	Course Name	Category	L	T	P	Credit
204DA1A6DC	HUMAN COMPUTER INTERACTION	DSE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The foundations of Human Computer Interactions (HCI)
- HCI implications for designing
- The guidelines for HCI user interface

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of Human Computer Interaction	K2
CO2	Know about the design and process of HCI	K2
CO3	Apply the software life cycle and design rules	K3
CO4	Analyze the User interface systems in HCI	K4
CO5	Evaluate the techniques used in HCI	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	M
CO5	S	S	M	S	M

S Strong

M Medium

L Low



204DA1A6DC	HUMAN COMPUTER INTERACTION	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Human and The Computer 11 h

The Human: I/O channels - Memory - Reasoning and problem solving. The Computer: Text Entry Devices - Display Devices - Physical Controls ,Sensors and Special Devices - Paper Printing and Scanning - Memory - processing and networks - Design Focus

Unit II Interaction and Paradigms 12 h

Introduction: Interaction Models - Frameworks and HCI - Ergonomics - Interaction styles - Elements - Interactivity- Interactive Design: Basics - Process of Design - Scenarios - Navigation design - screen design and Layout - Iteration and prototyping.

Unit III Software Process and Design Rules 12 h

Introduction: HCI in software process: Software life cycle - Usability Engineering - Iterative Design and Prototyping - design rationale. Design rules: Principles to Support Usability - standards - Guidelines - Golden rules and Heuristics - HCI patterns

Unit IV Implementation and User Support 13 h

Introduction - Elements of Windowing Systems - Programming the Application - Using toolkits - User Interface Management Systems - User Support : Requirements -Approaches of User Support - Adaptive help Systems - Designing User Support Systems

Unit V Evaluation Techniques 12 h

Evaluation - Introduction - Goals of evaluation - Evaluation through expert analysis - Evaluation through user participation - Choosing an evaluation method - Universal design: Universal design principles - Multi-modal interaction - Designing for diversity



Text Books

- 1 Alan Dix, Janet Finlay,(2004), Gregory Abowd, Russell Beale, "Human Computer Interaction", (3rd Edn), Pearson Education.

References

- 1 Ben Shneiderman, (2016), "Designing the User Interface: Strategies for Effective Human-Computer Interaction", (6th Edn) , Pearson.
- 2 Bill Scott and Theresa Neil,(2009), "Designing Web Interfaces", (1st Edn), O'Reilly.



Course Code	Course Name	Category	L	T	P	Credit
204DA1A6DB	WEB ANALYTICS	DSE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The importance of qualitative data, get insights and techniques.
- About customer-centric approach in dealing with data.
- The principles, tools and methods of web intelligence.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the techniques of web data analytics	K2
CO2	Apply web data analytics on social, mobile and video data	K3
CO3	Analyze techniques for measuring the success of a website	K4
CO4	Assess the various cases to apply web data analytics	K4
CO5	Propose new metrics based solutions for user websites	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	S	S	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	M

S Strong

M Medium

L Low



204DA1A6DB	WEB ANALYTICS	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Web Analytics Basics 12 h

Introduction: Web Analytics 2.0 - Clickstream- multiple outcome analysis- experimentation and testing- voice of customer - competitive intelligence - The tactical shift - Optimal strategy for choosing web analytics

Unit II Clickstream analysis 12 h

Clickstream analysis: Metrics - Eight critical web metrics - Web metrics demystified -strategically aligned tactics for impactful web - Web analytics report - Foundational analytical strategies - clickstream analysis made actionable - Challenges

Unit III Qualitative Data 12 h

Measuring Success-Actionable Outcome KPIs - Moving beyond conversion rates- Micro and macro conversion-Measuring success for a non - ecommerce website - Leveraging qualitative data: Surveys- Web enabled emerging user research options

Unit IV Testing and Segmentation Analysis 12 h

A/B Testing - Multivariate testing - Actionable testing ideas - Controlled experiments - Competitive intelligence analysis - CI data source - types - secrets- website traffic analysis- Search and keyword analysis - Audience identification and Segmentation analysis

Unit V Emerging analytics 12 h

Emerging analytics: Social ,mobile, video: Measuring social web - The data challenge - Analyzing mobile customer experiences-measuring the success of blogs - quantifying the impact of Twitter - Analyzing the performance of videos



Text Books

- 1 Avinash Kaushik, (2010) , Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity, (1st Edn.), Wiley Publishing.

References

- 1 Bing Liu, (2012), "Sentiment Analysis and opinion mining", Morgan and claypool Publishing.
- 2 Eric Enge, Stephan Spencer, Jessie Stricchiola, (2005), "The Art of SEO: Mastering Search Engine Optimization", (3rd Edn.), O'Reilly.
- 3 Dietmar Jannach, Markus Zanker, (2011), Recommender system-An introduction, Cambridge University Press.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A6DD	DATA PRIVACY AND SECURITY	DSE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Secure computer systems that protect information and resist attacks
- A Comprehensive overview of the different facets of Information Security
- Types of ciphers and digital certificates

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the role of Information Security in organization	K2
CO2	Illustrate risk management process handled in the organization with business continuity planning	K3
CO3	Define authentication and explain the three commonly used authentication factors	K3
CO4	Explore various types of ciphers and encipherment techniques	K4
CO5	Learn the concept of digital certificates and its usage.	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	S	S
CO3	S	M	M	S	S
CO4	S	M	M	S	S
CO5	S	M	M	S	S

S Strong M Medium L Low



194DA1A6DD	DATA PRIVACY AND SECURITY	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Information Security 12 h

Introduction - History of Information Security- Security - Components of an Information System - Balancing Information Security and Access- The Systems Development Life Cycle - The Security Systems Development Life Cycle - Security Professionals and Organization

Unit II Risk Management 12 h

Introduction - Risk Identification: Planning and Organizing the Process - Identifying, Inventorying and Categorizing Assets- Classifying, Valuing, and Prioritizing Information Assets - Identifying and Prioritizing Threats - Specifying Asset Vulnerabilities - Risk Assessment- Risk Control: Strategies - Selecting Risk Control Strategies - Quantitative versus Qualitative Risk Control Strategies

Unit III Security Technology : Access Controls, Firewalls and VPNs 12 h

Introduction - Access Control: Access Control Mechanisms - Biometrics - Firewalls - Application Layer Proxy Firewalls- Media Access Control Firewalls - Hybrid firewalls Architecture - Selecting the Right Firewall - Configuring and Managing Firewalls - Protecting Remote Connections: Virtual Private Networks

Unit IV Cryptography Techniques 12 h

Introduction: Plain Text and Cipher Text - Substitution Techniques - Transposition Techniques - Encryption and Decryption - Symmetric and Asymmetric Key Cryptography - Steganography, Possible Types of Attacks

Unit V Public Key Infrastructure 12 h

Digital Certificates : Introduction - The Concept of Digital Certificates - Certification Authority(CA),Technical details of digital Certificate - Digital Certificate Creation - Trust Digital Certificates - Certificate Hierarchies and Self - Signed Digital Certificates - Certificate Types Private Key Management- The PRIX Model - Public Key Cryptography Standards (PKCS)



Text Books

- 1 Michael E Whitman and Herbert J Mattord, (2019), “Principles of Information Security”, (6th Edn), Course Technology, Cengage Learning. (Unit I -III).
- 2 Atul Kahate, (2006), “Cryptography and Network Security”, (4th Edn.), Tata McGraw Hill.(Unit IV -V)

References

- 1 William Stallings, “Cryptography and Network Security: Principles and Practice”, (6th Edn), Pearson Education.
- 2 John R Vacca ,(2013), “Computer and Information Security Handbooks”, (2nd Edn.), Elsevier.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A6DE	NATURAL LANGUAGE PROCESSING	DSE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental concepts and techniques of Natural Language Processing(NLP)
- The various strategies for NLP system evaluation and error analysis
- The various strategies of Natural Language Generation (NLG) and Machine translation approaches.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic standard notation for characterizing text sequences	K1
CO2	Describe word and sentence tokenization, and spelling error detection	K2
CO3	Evaluate N-gram language models by separating into training and test set	K3
CO4	Outline the concepts of phonetics and speech synthesis	K4
CO5	Relate NLG applications and machine translation approaches	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	M	M	S	M
CO3	S	S	M	S	M
CO4	S	S	M	S	S
CO5	S	S	M	S	S

S Strong

M Medium

L Low



194DA1A6DE	NATURAL LANGUAGE PROCESSING	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction 12 h

Knowledge in Speech and Language Processing - Models and Algorithms - Language, Thought and Understanding - History - Natural Language Processing (NLP) Applications - Challenges of NLP - Regular Expressions and Automata: Regular Expressions - Finite-State Automata (FSA) - Regular Languages and FSAs.

Unit II Words and Transducers 12 h

Finite-State Morphological Parsing - Construction of a Finite-State Lexicon -Finite-State Transducers - Sequential Transducers and Determinism - FSTs for Morphological Parsing -Transducers and Orthographic Rules - Combining FST Lexicon and Rules - Lexicon-Free FSTs -Word and Sentence Tokenization -Detecting and Correcting Spelling Errors -Minimum Edit Distance.

Unit III Word Processing 12 h

N-Grams - Word Counting - Training and Test sets - Evaluating N-Grams - Smoothing - Parts of Speech(PoS) Tagging: English word classes - Tagsets - PoS Tagging - Rule based POS tagging - HMM(Hidden Markov Model) PoS tagging - Transformation based tagging - Evaluation and error analysis.

Unit IV Speech 12 h

Phonetics: Articulatory phonetics - Phonological categories and Pronunciation Variation - Speech Synthesis: Text Normalization - Phonetic Analysis - Prosodic analysis - Automatic Speech Recognition - Architecture- HMM Applied to speech

Unit V Natural Language Generation(NLG) and Machine Translation 12 h

Architecture of NLG Systems -Generation Tasks and Representations - Applications of NLG - Machine Translation(MT): Problems in Machine Translation - Machine Translation Approaches - Direct - Rule-based - Corpus Based - Semantic or Knowledge-based MT systems.



Text Books

- 1 Daniel Jurafsky, James H Martin, (2009), "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", (2nd Edn.), Pearson Education Inc.
- 2 Tanveer Siddiqui, U.S. Tiwary, (2008), "Natural Language Processing and Information Retrieval", Oxford University Press.

References

- 1 James Allen, (1994), "Natural language Understanding", (2nd Edn), Pearson Education.
- 2 Steven Bird, Ewan Klein and Edward Loper, (2009), "Natural Language Processing with Python", (1st Edn), O'Reilly Media.



Course Code	Course Name	Category	L	T	P	Credit
194DA1A6DF	PREDICTIVE ANALYTICS	DSE	5	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The process to formulate business objectives, design, build, evaluate and implement predictive models
- Extract information from data to predict trends and behavior patterns
- Use of data, statistical algorithms and machine learning techniques

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals concepts of predictive analytics	K1
CO2	Provides a foundation for data summarizing and identifying potential problems in data	K2
CO3	Build and interpret descriptive models	K3
CO4	Analyze data using various predictive modeling algorithms	K4
CO5	Outline the concepts of Text Mining	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S Strong

M Medium

L Low



Dr.NGPASC

COIMBATORE | INDIA

B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)

194DA1A6DF	PREDICTIVE ANALYTICS	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction 11 h

Overview of Predictive Analytics – Predictive Analytics vs. Business Intelligence – Predictive Analytics vs. Statistics – Predictive Analytics vs. Data Mining – Challenges in Using Predictive Analytics – Predictive Analytics Processing Steps – Defining Data – Defining the Target Variable – Defining Measures of Success for Predictive Models – Case Study: Fraud Detection

Unit II Data Understanding and Preparation 12 h

Single Variable Summaries – Data Visualization in One Dimension – Histograms – Multiple Variable Summaries – Data Visualization, Two or Higher Dimensions : Scatter Plots – Scatter Plot Matrices – Overlaying the target Variable – Scatterplots in more than two dimensions – The Value of Statistical Significance – Data Preparation: Variable Cleaning – Feature Creation

Unit III Descriptive Modeling 12 h

Data Preparation Issues with Descriptive Modelling – Principal Component Analysis – Clustering Algorithms – Interpreting Descriptive Models – Standard Cluster Model Interpretation: Problems with interpretation methods – Identifying Key variables in-forming cluster Models – Cluster Prototypes – Cluster Outliers

Unit IV Predictive Modeling 13 h

Decision Trees – Logistic Regression: Interpreting Logistic Regression Models – Practical Consideration for Logistics Regressions – Neural Networks – K-Nearest Neighbor – Naïve Bayes – Regression Models – Linear Regression: Assumptions – Variable Selection – Interpreting Linear Regression Model – Linear Regression for Classification

Unit V Text Mining 12 h

Introduction – A Predictive Modeling Approach to Text mining – Structured vs. Unstructured Data – Text Mining Applications – Data Sources for Text Mining – Data Preparation Steps – Text Mining Features – Modeling with text Mining Features – Regular Expressions – Survey Analysis Case Study – Help Desk Case Study



Text Books

- 1 Dean Abbott,(2014),"Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst", John Wiley & Sons Inc.

References

- 1 Eric Siegel, (2015), "Predictive Analytics", Wiley.
- 2 Daniel T. Larose, "Data Mining and Predictive Analytics", (1st Edn), Wiley



Course Code	Course Name	Category	L	T	P	Credit
193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The role of Entrepreneurship in Economic Development and basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Patents
- Ethical and professional aspects related to intellectual property law context
- Intellectual Property(IP) as an career option

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of innovation, IPR, entrepreneurship and its role in economic development	K2
CO2	Know the value , purpose and process of Patent	K2
CO3	Understand the basics of trademarks and industrial designs	K2
CO4	Acquire knowledge about copyright and copyright law	K2
CO5	Identify Geographical Indications	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	M
CO2	S	M	M	M	M
CO3	S	M	M	M	M
CO4	S	M	M	M	M
CO5	S	M	M	M	M

S Strong

M Medium

L Low



193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	SEMESTER VI
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Innovation, IPR and Entrepreneurship 05 h

Meaning of Creativity, Invention and innovation - Types of Innovation - Introduction and the need for Intellectual Property Right (IPR) - Kinds of IPR - National IPR Policy. Entrepreneurs-Concept, characteristics, Functions, need and types, Entrepreneurial decision process. Role of Entrepreneurship in Economic Development.

Case Study: Jayabharati Viswanath: A case of Ladel to Leather.

Unit II Patents 05 h

Introduction and origin of Patent System in India- Conceptual Principles of Patent Law in India - Process for obtaining patent - Rights granted to a Patentee - Infringement of Patent.

Case Study: When Google was used for Patent Infringement.

Unit III Trademarks 05 h

Origin of Trade Marks System - Types - Functions - Distinctiveness and Trademarks - Meaning of Good Trademark - Rights granted by Registration of Trademarks - Infringement of trademark.

Case Study: Trademark mismanagement by Cadbury's.

Unit IV Copyright 05 h

Introduction and Evolution of Copyright - Objectives and fundamentals of Copyright Law - Requirements for Copyrights - Works protectable under Copyrights - Authorship and Ownership - Rights of Authors and Copyright owners - Infringement of Copyright.

Case Study: Copyright Case of Napster and Grokster.

Unit V Geographical Indications 04 h

Introduction and Concept of Geographical Indications - History - Administrative Mechanism - Benefits of Geographical Indications - Infringement of registered Geographical Indication.

Case Study: The story of the Tirupati Laddu.

Note:Case studies related to the above topics to be discussed (Examined internal only)



Text Book

- 1 Nithyananda, K V. 2019, "Intellectual Property Rights, Protection and Management", Cengage Learning India Private Limited, New Delhi, India.
- 2 Dr. S. S. Khanka, 2020, "Entrepreneurial Development", S Chand and Company Limited, New Delhi, India.

References

- 1 Ahuja, V K. 2017, "Law relating to Intellectual Property Rights", 3rd Edition, Lexis Nexis, Gurgaon, India.
- 2 Neeraj, P., & Khusdeep, D., 2014, "Intellectual Property Rights", 1st Edition, PHI Learning Private Limited, New Delhi, India.
- 3 <http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf>.
- 4 <https://knowledgentia.com/knowledgeate>.

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23/12/21

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Dr. NGPASC
COIMBATORE | INDIA

B.Sc. Computer Science with Data Analytics (Students admitted during the AY 2020-21)