

Dr. N.G.P. ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)
(Approved by Government of Tamil Nadu & Accredited by NAAC with A++ Grade (3rd Cycle - 3.64 CGPA)
Dr. N.G.P. - Kalapatti Road, Coimbatore - 641 048, Tamil Nadu, India
Web : www.dnpgpasc.ac.in | Email : info@dnpgpasc.ac.in | Phone : +91-422-2369100

REGULATIONS 2022 - 23 for Under Graduate Programme (Outcome Based Education model with Choice Based Credit System)

Bachelor of Science in Artificial Intelligence and Machine Learning (For the students admitted during the academic year 2022-23)

Programme: B.Sc. Artificial Intelligence and Machine Learning

Eligibility

Candidates for admission to the first year of the **Bachelor of Science (Artificial Intelligence and Machine Learning)** Degree Programme shall be required to have passed in the Higher Secondary Examinations conducted by the Government of Tamil Nadu in the relevant subjects or an Examination accepted as equivalent thereto by the Academic Council. Subject to such other conditions as may be prescribed there to be permitted to appear and qualify with anyone of the following subjects: Mathematics / Computer Science and wherever the students have not studied Mathematics, the necessary Mathematics knowledge be imparted through Tutorial/Bridge Course.

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 achieve professional skills in IT/ITEs sector
2. Support the growth of economy of a country by starting enterprise with a lifelong learning attitude.
3. To take part in socio-based research activity focused on the advanced areas of AI&ML.



PROGRAMME OUTCOMES

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

PO Number	PO Statement
PO1	Apply the Computer Science principles and paradigms in designing system components and processes to meet the specific industry needs.
PO2	To develop intelligent automated systems by applying analytical and programming skills to resolve real time issues and challenges.
PO3	Exhibit proficiency in AI&ML for providing finite solutions to the industry.
PO4	Build the young minds with research attitude with respect to the needs of the society.
PO5	Employ to adapt for the modern platforms in-terms of employability, entrepreneur-ship and also to pursue for their higher studies.



B.Sc. Artificial Intelligence and Machine Learning Credit Distribution

3


Part	Subjects	No. of Papers	Credit	Semester No.
I (12 Credits)	Tamil / Hindi / French/Malayalam	4	4 x 3 = 12	I to IV
II (12 Credits)	English	4	4 x 3 = 12	I to IV
III (108 Credits)	Core (Credits 4)	11	11 x4= 44	I to VI
	Core (Credits 3)	2	2 x 3 = 6	I to VI
	Core (Credits 5)(Embedded- Core)	2	2 x 5 = 10	III to IV
	Core Project (Credits 4)	1	1 x 4 =4	VI
	Core Practical (Credits 2)	3	3 x 2 = 6	I to VI
	Inter Departmental Course (IDC)	4	4 x 4 = 16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course(SEC)	4	4 x 2 = 8	III ,IV,V&VI
	Industrial Training	1	1 x 2=2	V
IV (8 Credits)	Environmental Studies(AECC)	1	2	I
	Basic Tamil/Advance Tamil/Human Rights, & Women's Rights (AECC)	1	2	II
	Generic Elective(GE)	1	2	V
	Innovation & IPR/ Innovation, IPR & Entrepreneurship (AECC)	1	2	VI
V (2 Credits)	NSS/NCC/YRC/RRC/Yoga/Sports	-	2	I - II
TOTAL CREDITS			142	



CURRICULUM
B. Sc. ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Course Code	Course Category	Course Name	L	T	P	Exam (hours)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part- I										
221TL1A1TA	Language-I	Tamil-I : Ikkala Ilakkiyam	4	1	-	3	50	50	100	3
221TL1A1HA		Hindi-I : Modern Literature								
221TL1A1MA		Malayalam-I : Modern Literature								
221TL1A1FA		French -I: Grammar, Translation and Civilization								
Part- II										
221EL1A1EA	Language-II	Professional English -I	4	-	1	3	50	50	100	3
Part- III										
224AI1A1CA	Core - I	Problem Solving and Programming in C	4	1	-	3	50	50	100	4
224AI1A1CP	Core Practical - I	C Programming	-	-	4	3	50	50	100	2
224IT1A1CA	Core -II	Digital Computer Fundamentals	4	-	-	3	50	50	100	4
222MT1A1ID	IDC - I	Mathematics for Computing - I	4	1	-	3	50	50	100	4
Part-IV										
223MB1A1AA	AECC-I	Environmental Studies	2	-	-	-	50	-	50	2
Part-V										
224AI1A1XA	Extension Activity	NSS/NCC/ YRC/RRC/ Yoga/Sports/ Clubs	-	-	-	-	50	-	50	1
Total			22	3	5	-	-	-	700	23


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BoS- 1 st	AC - 13/15	GB - 18/15
29.07.22	06.09.22	10.09.22

B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part-I										
221TL1A2TA	Language-I	Tamil-II: Ara Ilakkiyam	4	1	-	3	50	50	100	3
221TL1A2HA		Hindi-II : Modern Literature								
221TL1A2MA		Malayalam-II : Modern Literature								
221TL1A2FA		French-II: Grammar, Translation and Civilization								
Part- II										
221EL1A2EA	Language-II	Professional English -II	4	-	1	3	50	50	100	3
Part- III										
224CA1A2CA	Core - III	Data Structures	4	1	-	3	50	50	100	4
224CS1A2CA	Core - IV	Object Oriented Programming with C++	4	-	-	3	50	50	100	4
224AI1A2CP	Core Practical - II	Data Structures and C++	-	-	4	3	50	50	100	2
222MT1A2ID	IDC - II	Mathematics for Computing - II	4	1	-	3	50	50	100	4
Part-IV										
221TL1A2AA	AECC-II	Basic Tamil	2	-	-	-	50	-	50	2
221TL1A2AB		Advance Tamil								
225CR1A2AA		Human Rights and Women's Rights								
Part-V										
224AI1A2XA	Extension Activity	NSS/NCC/ YRC/RRC/ Yoga/Sports/ Clubs	-	-	-	-	50	-	50	1
Total			22	3	5	-	-	-	700	23

 5/12/22
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BoS- 2nd	AC - 14th	GB - 19th
05/12/2022	19.01.23	30.01.23



Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
PART - I										
221TL1A3TA	Language - I	Tamil -III	3	1	-	3	50	50	100	3
221TL1A3HA		Hindi-III								
221TL1A3MA		Malayalam-III								
221TL1A3FA		French-III								
PART - II										
221EL1A3EA	Language - II	Professional English - III	3	1	-	3	50	50	100	3
PART - III										
224DA1A3CA	Core - V	Database System Concepts	4	-	-	3	50	50	100	4
224CS1A3CA	Core - VI	Operating Systems	3	-	-	3	50	50	100	3
224AI1A3CP	Core Practical - III	Programming in Java	3	-	4	3	50	50	100	5
224AI1A3SP	SEC Practical - I	SQL -PL/SQL	-	-	4	3	50	50	100	2
222MT1A3ID	IDC - III	Discrete Mathematics	4	-	-	3	50	50	100	4
Total			20	2	8	-	-	-	700	24

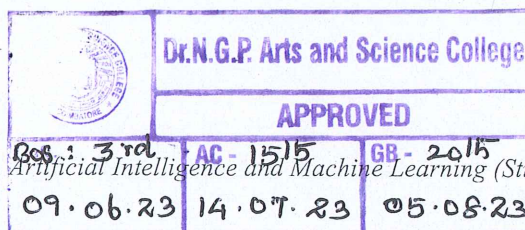
EXTRA CREDIT COURSES

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

Semester III


S. No.	Course Code	Name of the Course
1	224AI1ASSA	Business Intelligence
2	224AI1ASSB	Big Data Technologies



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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits	
							CIA	ESE	Total		
Fourth Semester											
PART - I											
221TL1A4TA	Language - I	Tamil -IV	3	1	-	3	50	50	100	3	
221TL1A4HA		Hindi-IV									
221TL1A4MA		Malayalam-IV									
221TL1A4FA		French-IV									
PART - II											
221EL1A4EA	Language - II	Professional English - IV	3	1	-	3	50	50	100	3	
PART-III											
224AI1A4CA	Core - VII	Foundations of Artificial Intelligence	4	-	-	3	50	50	100	4	
224AI1A4CB	Core - VIII	Design and Analysis of Algorithms	3	-	-	3	50	50	100	3	
224DA1A4EP	Embedded Practical	Python for Data Science	3	-	4	3	50	50	100	5	
224AI1A4SP	SEC Practical - II	Artificial Intelligence	-	-	4	3	50	50	100	2	
225BI1A4IA	IDC -IV	Digital Banking	4	-	-	3	50	50	100	4	
Total			20	2	8	-	-	-	700	24	


 18/10/23
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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											
224DA1A5CA	Core - IX	Computer Networks and Communication	4	1	-	3	50	50	100	4	
224AI1A5CA	Core - X	Machine Learning Techniques	4	1	-	3	50	50	100	4	
224AI1A5CB	Core-XI	R Programming	4	1	-	3	50	50	100	4	
224AI1A5CP	Core Practical - V	Machine Learning	-	-	4	3	50	50	100	2	
224AI1A5SP	SEC Practical -III	Data Visualization Techniques	-	-	4	3	50	50	100	2	
224AI1A5DA	DSE -I	Human Computer Interaction	4	1	-	3	50	50	100	4	
224AI1A5DB		Cloud Computing Services									
224AI1A5DC		Software Engineering Principles									
224AI1A5TA	IT	Industrial Training	-	-	-	3	50	50	100	2	
PART- IV											
224AI1A5GA	GE	AI Essentials	2	-	-	3	50	-	50	2	
Total			18	4	8	-	-	-	750	24	


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4/4/24	17/4/24	



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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
PART-III										
224AI1A6CA	Core - XII	Natural Language Processing	4	-	-	3	50	50	100	4
224AI1A6CB	Core - XIII	Cybersecurity Essentials	4	-	-	3	50	50	100	4
224AI1A6SP	SEC Practical -IV	Natural Language Processing using Python	-	-	4	3	50	50	100	2
224AI1A6CV	Core - XIV	Project and Viva voce	-	-	8	3	50	50	100	4
224AI1A6DA	DSE -II	Deep Learning Techniques	4	-	-	3	50	50	100	4
224AI1A6DB		Internet of Things and Smart Systems								
224AI1A6DC		Service Oriented Architecture								
224AI1A6DD	DSE -III	Fuzzy Logic and Neural Networks	4	-	-	3	50	50	100	4
224AI1A6DE		Principles of Robotics								
224AI1A6DF		UI and UX Design								
Part - IV										
223BC1A6AA	AECC-III	Innovation, IPR and Entrepreneurship	2	-	-	3	50	-	50	2
Total			18	-	12	-	-	-	650	24
*Grand total									4200	142

*Total Credit should not exceed 142 credits



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8.11.24	26.11.24

B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)



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	224AI1A5DA	Human Computer Interaction
2	224AI1A5DB	Cloud Computing Services
3	224AI1A5DC	Software Engineering Principles

Semester VI (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	224AI1A6DA	Deep Learning Techniques
2	224AI1A6DB	Internet of Things and Smart Systems
3	224AI1A6DC	Service Oriented Architecture

Semester VI (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	224AI1A6DD	Fuzzy Logic and Neural Networks
2	224AI1A6DE	Principles of Robotics
3	224AI1A6DF	UI and UX Design

GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective Course

Semester V (GE)

S. No.	Course Code	Name of the Course
1	224AI1A5GA	AI Essentials

EXTRA CREDIT COURSES

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

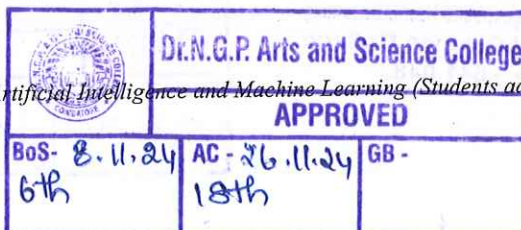
Semester III

S. No.	Course Code	Name of the Course
1	224AI1ASSA	Business Intelligence
2	224AI1ASSB	Big Data Technologies



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UG - REGULATION (R4)

(Students admitted in the AY 2022-23)

(OUTCOME BASED EDUCATION WITH CBCS)

1.NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge Eg. Faculty of Computer Science consists of disciplines like Departments of Computer Science, Information Technology, Computer Technology, Computer Applications, Data analytics, Cognitive Systems and Artificial Intelligence and Machine Learning.

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 2022-25 refers to students belonging to a 3 year Degree programme admitted in 2022 and completing in 2025.

1.4 Course: Refers to component 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 learning needs.

- a) **Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement
- 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:** Elective courses offered under main discipline/ subject of study.
- d) **Skill Enhancement Courses (SEC):** Value-based and/or skill-based courses which are aimed at providing hands-on-training, competencies, skills, etc.
- e) **Ability Enhancement Compulsory Courses (AECC):** Mandatory courses that lead to Knowledge enhancement. Environmental Science, Human Rights and Women's Rights, Basic Tamil/Advanced Tamil, Innovation and IPR/Innovation, IPR and Entrepreneurship.
- f) **Ability Enhancement Elective Course (AEEC)/Generic Elective (GE)** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is Generic Elective.



1.5 Project Work:

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.

Internship/Industrial Training

Students must undertake industrial / institutional training for a minimum of 15 days during the IV semester summer vacation. The students will submit the report for evaluation during V semester.

1.6 Extra Credits:

Extra credits shall be awarded for achievements in identified Curricular/co-curricular activities executed outside the regular class hours. Extra credits are not mandatory for completing the programme.

2. STRUCTURE OF PROGRAMME

2.1 PART- I: LANGUAGE- I

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

2.2 PART- II: LANGUAGE- II

English will be offered during the first four semesters.

2.3 PART- III:

- Core Course
- Inter Departmental Course (IDC)
- Discipline Specific Elective (DSE)
- Skill Enhancement Course (SEC)
- Industrial Training (IT)

2.4 PART- IV:

2.4.1 Ability Enhancement Compulsory Course (AECC):

The Ability Enhancement Compulsory Courses such as i) Environmental Studies, ii) Human Rights and Womens' Rights, iii) Innovation and IPR/ Innovation, IPR and Entrepreneurship are offered during I,II and VI Semester.

Basic Tamil

a) Those who have not studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take one Basic Tamil course in the second semester.

(OR)

Advanced Tamil



b) Those who have studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take one Advanced Tamil course in the second semester.

Note: Students who come under the above a+b categories are exempted from Human Rights and Women's Rights in second semester.

Ability Enhancement Elective Course (AEEC)/Generic Elective (GE) An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is Generic Elective offered in V semester. (Theory/Practical/Non-Lab Practical)

2.5 PART- V: EXTENSION ACTIVITIES

The following extracurricular activities like NSS/YRC/NCC/RRC/Yoga/Sports/Clubs are offered under extension activities during semester I & II. Students will be evaluated based on their active participation in any one of the above activities. 75% Attendance is compulsory for extension activity.

3. CREDIT ALLOTTMENT

The following is the credit allotment:

- Lecture Hours (Theory) : 1 credit per lecture 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

4. DURATION OF THE PROGRAMME

The B.A. /B.Com./B. Sc. Programme must be completed within 3 years (6 semesters) and a maximum of 6 years (12 semesters) from the date of acceptance to the programme. If not, the candidate must enroll in the course determined to be an equivalent by BoS in the most recent curriculum recommended for the Programme.

5.REQUIREMENTS FOR COMPLETION OF A SEMESTER

Every student shall ordinarily be allowed to keep terms for the given semester in a program of his/ her enrolment, only if he/ she fulfills at least seventy five percent (75%) of the attendance taken as an average of the total number of lectures, practicals, tutorials, etc. wherein short and/or long excursions/field visits/study tours organized by the college and supervised by the faculty as envisaged in the syllabus



shall be credited to his/her attendance. Every student shall have a minimum of 75% as an overall attendance.

6. 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 shall be 100 with the following breakup:

a) Mark distribution for Theory Courses

Continuous Internal Assessment (CIA) : 50 Marks

End Semester Exams (ESE) : 50 Marks

Total :100 Marks

i) Distribution of Internal Marks

S.No.	Particulars	Distribution of Marks
1	CIA I (2.5 Units) (On completion of 45 th working day)	15
2	Model (All 5 Units) (On completion of 85 th working day)	15
3	Assignment	05
4	Attendance	05
5	Library Usage	05
6	Skill Enhancement *	05
Total		50

Assignment Rubric

(Maximum -20 marks converted to 5 marks)

Criteria	4 marks	3 Marks	2 Marks	1 MARK
Language	Excellent spelling and Grammar	Good spelling and Grammar	Reasonable spelling and Grammar	Bad spelling and Grammar
Style	Outstanding style beyond usual college level	Attains College level style	Approaches College level style	Elementary form with little or no variety in



				sentence structure
Referencing	Good use of wide range of reference sources	Moderate use of suitable reference materials	Shows signs of plagiarism & using sources without referencing	No reference material used
Development	Main points well developed with high quality and quantity support	Main points developed with quality and quantity supporting details	Main points are present with limited details and development	Main points lack detailed development
Critical thinking/Problem solving	Advanced attempt to interpret the process, content/ analyse and solve the problem	Proficient attempt to interpret the process, content/ analyse and solve the problem	Adequate attempt to interpret the process, content/ analyse and solve the problem	Limited attempt to interpret the process, content/ analyse and solve the problem

Breakup for Attendance Marks:

S.No	Attendance Range	Marks Awarded
1	95% and Above	5
2	90% - 94%	4
3	85% - 89%	3
4	80% - 84%	2
5	75% - 79%	1

Note:

Special Cases such as NCC, NSS, Sports, Advanced Learner Course, Summer Fellowship and Medical Conditions etc. the attendance exemption may be given by principal and Mark may be awarded.



Break up for Library Marks:

S.No	Attendance Range	Marks Awarded
1	10h and above	5
2	9h- less than 10h	4
3	8h - less than 9h	3
4	7h - less than 8h	2
5	6h - less than 7h	1

Note:

In exception, the utilization of e-resources of library will be considered.

***Components for "Skill Enhancement" may include the following:**

Class Participation, Case Studies Presentation, Field Study, Field Survey, Group Discussion, Term Paper, Presentation of Papers in Conferences, Industry Visit, Book Review, Journal Review, e-content Creation, Model Preparation & Seminar.

Components for Skill Enhancement

Any one of the following should be selected by the course coordinator

S.No.	Skill Enhancement	Description
1	Class Participation	<ul style="list-style-type: none"> Engagement in class Listening Skills Behaviour
2	Case Study Presentation/ Term Paper	<ul style="list-style-type: none"> Identification of the problem Case Analysis Effective Solution using creativity/imagination
3	Field Study	<ul style="list-style-type: none"> Selection of Topic Demonstration of Topic Analysis & Conclusion
4	Field Survey	<ul style="list-style-type: none"> Chosen Problem Design and quality of survey Analysis of survey
5	Group Discussion	<ul style="list-style-type: none"> Communication skills Subject knowledge Attitude and way of presentation Confidence Listening Skill
6	Presentation of Papers in Conferences	<ul style="list-style-type: none"> Sponsored International/National Presentation Report Submission



7	Industry Visit	<ul style="list-style-type: none"> • Chosen Domain • Quality of the work • Analysis of the Report • Presentation
8	Book Review	<ul style="list-style-type: none"> • Content • Interpretation and Inferences of the text • Supporting Details • Presentation
9	Journal Review	<ul style="list-style-type: none"> • Analytical Thinking • Interpretation and Inferences • Exploring the perception if chosen genre • Presentation
10	e-content Creation	<ul style="list-style-type: none"> • Logo/ Tagline • Purpose • Content (Writing, designing and posting in Social Media) • Presentation
11	Model Preparation	<ul style="list-style-type: none"> • Theme/ Topic • Depth of background Knowledge • Creativity • Presentation
12	Seminar	<ul style="list-style-type: none"> • Knowledge and Content • Organization • Understanding • Presentation

ii) Distribution of External Marks

Total	:	50
Written Exam	:	50

Marks Distribution for Practical course

Total	:	100
Internal	:	50
External	:	50



i) Distribution of Internals Marks

S.No.	Particulars	Distribution of Marks
1	Experiments/Exercises	15
2	Test 1	15
3	Test 2	15
4	Observation Notebook	05
Total		50

ii) Distribution of Externals Marks

S.No.	Particulars	External Marks
1	Materials and methods/ Procedures/ Aim	10
2	Experiment/ Performance/ Observations/ Algorithm	10
3	Results/ Calculations/ Spotters/ Output	10
4	Inference/Discussion/ Presentation	10
5	Record	6
6	Viva- voce	4
Total		50

A) Mark Distribution for Project/Internship/Industrial Training

Total	:	100
Internal	:	50
External	:	50

i) Distribution of Internal Marks

S.No.	Particulars	Internal Marks
1	Review I	20
2	Review II	20
3	Attendance	10
Total		50



ii) Distribution of External Marks

S.No	Particulars	External Marks
1	Project Work/Internship/ Industrial training presentation	40
2	Viva -voce	10
Total		50

Evaluation of project Work/Internship/ Industrial training shall be done jointly by Internal and External Examiners

7. Credit Transfer

a. Upon successful completion of 1 NPTEL Course (4 Credit Course) recommended by the department, during Semester I to IV, a student shall be eligible to get exemption of one 4 credit course during the V or VI semester. The proposed NPTEL course should cover content/syllabus of exempted core paper in V or VI semester.

S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option - 1 Paper title	4
			Option - 2 Paper title	
			Option - 3 Paper title	

b. Upon successful completion of 2 NPTEL Courses (2 Credit each) recommended by the department, during Semester I to IV, a student shall be eligible to get exemption of one 4 credit course during the V or VI semester. Out of 2 NPTEL proposed courses, at least 1 course should cover content/syllabus of exempted core paper in V or VI semester.

Mandatory

The exempted core paper in the V or VI semester should be submitted by the students for approval before the end of 4th semester.

Credit transfer will be decided by equivalence committee



S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option – 1 Paper title	2
			Option – 2 Paper title	
			Option – 3 Paper title	
2			Option – 1 Paper title	2
			Option – 2 Paper title	
			Option – 3 Paper title	

NPTEL Courses to be carried out during semester I – IV.					
S.No.	Student Name	Class	Proposed NPTEL Course		Proposed Course for Exemption
			Course I	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	Any one Core Paper in V or VI Semester
			Course II	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	

Upon Successful outcome of Design Thinking / Copy right/Product/ Patent by the end of the V Semester, student shall be eligible to get exemption in AECC: Innovation, IPR & Entrepreneurship / Innovation & IPR offered during VI Semester.

9. Internship/Industrial Training

Students must undertake industrial / institutional training for a minimum of 15 days during the IV semester summer vacation. The students shall submit the report for evaluation during V semester.

10. Extra Credits: 10

Earning extra credit is not essential for programme completion. Student is entitled to earn extra credit for achievement in Co-Curricular/ Extracurricular activities carried out other than the regular class hours.

A student is permitted to earn a maximum of Ten extra Credits during the programme period. A maximum of 1 credit under each category is permissible.



Category	Credit
Proficiency in foreign language	1
Proficiency in Hindi	1
Self study Course	1
Typewriting/Short hand	1
CA/ICSI/CMA (Foundations)	1
CA/ICSI/CMA (Inter)	1
Sports and Games	1
Publications / Conference Presentations (Oral/Poster)/ Awards	1
Lab on Project	1
Innovation / Incubation / Patent / Sponsored Projects / Consultancy/	1
Representation in State / National level celebrations	1
Awards/ Recognitions / fellowships	1

Credit shall be awarded for achievements of the student during the period of study only.

GUIDELINES

Proficiency in foreign language

A pass in any foreign language in the examination conducted by an authorized agency.

Proficiency in Hindi

A pass in the Hindi examination conducted by Dakshin Bharat Hindi Prachar Sabha.

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

Self study Course

A pass in the self study courses offered by the department.

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

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.

CA/ICSI/CMA(Foundations)

Qualifying foundation in CA/ICSI/CMA / etc.



Sports and Games

The Student can earn extra credit based on their Achievement in sports in University/ State / National/ International.

Publications / Conference Presentations (Oral/Poster)

Research Publications in Journals

Oral/Poster presentation in Conference

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.

(Evaluation will be done internally)

Innovation / Incubation / Patent / Sponsored Projects / Consultancy

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

Representation in State/ National level celebrations

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

Awards/ Recognitions/fellowships

Regional/ State / National level awards/ Recognitions/Fellowships

100 % CIA Courses :

- AECC
- AECC

S.No	Type of Course
1	Environmental Studies (AECC)
2	Human Rights and Women's Rights, Basic Tamil / Advanced Tamil (AECC)
3	Innovation & IPR/ Innovation, IPR and Entrepreneurship (AECC)
4	Generic Elective (AECC)



Modalities for Implementing Internal Assessment Marks:

- Student pertaining to 2022 Batch (2022-25) UG programme for the above mentioned courses shall secure a minimum of 40% out of the maximum marks in the continuous internal assessment (CIA) i.e., 20 marks out of 50 marks.
- Students who have not acquired the minimum marks shall be allowed to reappear to improve their marks in the exam components only within the time duration of the programme, in the forthcoming semesters.

Distribution of Internal Marks for AECC & AECC (Theory)

S.No.	Particulars	Distribution of Marks
1	CIA I (2.5 Units) (On completion of 45 th working day)	15
2	Model (All 5 Units) (On completion of 85 th working day)	15
3	Assignment	05
4	Attendance	05
5	Library Usage	05
6	Skill Enhancement *	05

50

Total

Distribution of Internal Marks for Generic Elective (AECC) (Practical)

S.No.	Particulars	Distribution of Marks
1	CIA -I (1-5 Exercise)	5
2	CIA-II (6-10 Exercise)	5
3	Class Participation	10
4	Practical Record	10
5	Test-III & Viva -Voce(10+10)	20

50

Total



Question paper pattern AECC & AEEC

Test	MARKS	DESCRIPTION	TOTAL	Remarks
CIA Test I 1 Hour First 2.5 Units	50 x 1 = 50 Marks	MCQ	50 Marks	Marks secured will be Converted to 15 marks
CIA test II/ Model test 1 Hour All five Units	50 x 1 = 50 Marks	MCQ	50 Marks	Marks secured will be Converted to 15 marks

Question paper pattern		Total Marks - 50	
<u>Basic Tamil</u>		<u>Advanced Tamil</u>	
Section -A		Section -A	
Choose the correct answer	10x2=20	Choose the correct answer	10x1=10
Section -B		Section -B	
True or false	10x2=20	Fill in the blanks	10x2=20
Section -C		Section -C	
Answer in one page	1x10=10	Write an essay in two pages	2x10=20

Question paper pattern for all other courses falling under Part I to Part III

CIA Test : [1 1/2 Hours-2.5 Units] - 25 Marks

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section - A	8 x 0.5 = 04 Mark	MCQ	25 Marks	Marks secured will be converted to 15 marks
Section - B	3 x 3 = 09 Mark	Answer ALL Questions Either or Type ALL Questions Carry Equal Marks		
Section - C	2 x 6 = 12 Mark			



Model Test: [3 Hours-5 Units] - 50 Marks

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section - A	5 x 1 = 05 Marks	MCQ	50 Marks	Marks secured will be converted to 15 marks
Section - B	5 x 3 = 15 Marks	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Marks		
Section - C	5 x 6 = 30 Marks			

End Semester Examination: [3 Hours-5 Units] - 50 Marks

SECTION	MARKS	DESCRIPTION	TOTAL
Section - A	5 x 1 = 05 Marks	MCQ	50 Marks
Section - B	5 x 3 = 15 Marks	Answer ALL Questions (Either or Type Questions) Each Questions Carry Equal Marks	
Section - C	5 x 6 = 30 Marks		



Course Code	Course Name	Category	L	T	P	Credit
221TL1A1TA	TAMIL- I:IKKALA ILAKKIYAM	LANGUAGE- I	4	1	-	03

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழின் பண்பாடுநாகரீகம்,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)- மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு(Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

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

<input checked="" type="checkbox"/> Skill Development	<input checked="" type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input checked="" type="checkbox"/> Innovations
<input checked="" type="checkbox"/> Intellectual Property Rights	<input checked="" type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input checked="" type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



221TL1A1TA	TAMIL- I:IKKALA ILAKKIYAM	SEMESTER I
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I மறுமலர்ச்சிக் கவிதைகள்

13 h

1. இலக்கிய வரலாறு - மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள்
2. பாரததேசம் - பாரதியார்
3. படி - பாரதிதாசன்
4. தமிழரின் பெருமை - நாமக்கல்கவிஞர்
5. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
6. திரைத்தமிழ்

அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி' எனத்தொடங்கும்

பாடல் - உடுமலை நாராயண கவி

ஆ) 'சும்மா கிடந்த நிலத்தை' எனத்தொடங்கும் பாடல் -

பட்டுக்கோட்டை கல்யாண சுந்தரனார்

இ) 'சமரசம் உலாவும் இடமே' எனத்தொடங்கும் பாடல்- மருதகாசி

ஈ) 'உன்னை அறிந்தால்' எனத்தொடங்கும் பாடல் - கண்ணதாசன்

Unit II புதுக்கவிதைகள்

13 h

1. இலக்கிய வரலாறு - புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
2. கடமையைச் செய் - மீரா
3. மலையாளக் காற்று - சிற்பி
4. ஒப்பிலாத சமுதாயம் - அப்துல் ரகுமான்
5. கன்னிமாடம் - மு.மேத்தா
6. கரிக்கிறது தாய்ப்பால் - ஆரூர் தமிழ்நாடன்
7. ஐந்தாம் வகுப்பு 'அ' பிரிவு - நா. முத்துக்குமார்
8. ஹைகூ கவிதைகள் - 10 கவிதைகள்

Unit III பெண்ணியம்

09 h

1. தொலைந்து போனேன் - தாமரை



2. நீரில் அலையும் முகம் - அ. வெண்ணிலா
3. தற்காத்தல் - பொன்மணி வைரமுத்து
4. ஏனிந்த வித்தியாசங்கள் ?- மல்லிகா
5. புதையுண்ட வாழ்க்கை - சுகந்தி சுப்ரமணியன்

Unit IV சிறுகதைகள்

15 h

1. இலக்கிய வரலாறு - சிறுகதையின் தோற்றமும் வளர்ச்சியும்
2. கனகாம்பரம் - கு.ப.ராஜகோபாலன்
3. ஆற்றங்கரைப் பிள்ளையார் - புதுமைப்பித்தன்
4. பொம்மை - ஜெயகாந்தன்
5. காய்ச்சமரம் - கி. ராஜநாராயணன்
6. காட்டில் ஒருமான் - அம்பை
7. வேட்கை - சூர்யகாந்தன்

Unit V பயிற்சிப் பகுதி

10 h

அ. இலக்கணம்

1. வல்லின ஒற்று மிகும், மிகா இடங்கள் - ஒற்றுப்பிழை நீக்கி எழுதுதல்
2. ர,ற - ல,ழ,ள - ண,ந,னவேறுபாடு - ஒலிப்பு நெறி, சொற்பொருள் வேறுபாடு அறிதல்)

ஆ. படைப்பாக்கம்

1. கவிதை- எழுதுதல் (15 வரிகள் முதல் 30 வரிகள் வரை)
2. சிறுகதை - எழுதுதல் (குறைந்தது 3 பக்கங்கள்)

Text Book

- தமிழ் மொழிப்பாடம் - 2022-2023, தொகுப்பு: தமிழ்த்துறை,
1 டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர் -
641048, வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை - 600 098.




Dr. NGPASC
COIMBATORE | INDIA

B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

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 இணையதள முகவரி: <https://www.tamilvu.org>

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29.07.22	06.09.22	10.09.22



Course Code	Course Name	Category	L	T	P	Credit
221TL1A1HA	HINDI- I: MODERN LITERATURE	LANGUAGE-I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- 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				✓	✓
CO2		✓	✓		
CO3		✓	✓		
CO4		✓	✓	✓	✓
CO5		✓	✓	✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input checked="" type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input checked="" type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input checked="" type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



221TL1A1HA	HINDI- I: MODERN LITERATURE	SEMESTER I
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 13 h

गद्य - नूतनगद्यसंग्रह(जयप्रकाश)पाठ 1- रजियापाठ 2- मक़ीलपाठ 3- बहतापानीनिर्मला
पाठ 4- राष्ट्रपितामहात्मागाँधी

Unit II 13 h

कहानीकुंज- डॉ.वी.पी. 'अमिताभ'(पाठ 1-4)

Unit III 12 h

व्याकरण : शब्दविचार (संज्ञा, सर्वनाम,विशेषण)

Unit IV 12 h

अनुच्छेद लेखन

Unit V 10 h


अनुवाद अभ्यास-III (केवल अंग्रेजी से हिन्दी में) (पाठ 1 to 10)

Text Books

- 1 प्रकाशक: सुमित्रप्रकाशन 204 लीलाअपाटर्मेंट्स, 15 हेस्टिंग्सरोड' अशोकनगरइलाहाबाद-211001
- 2 प्रकाशक: गोविन्दप्रकाशनसदरबाजार, मथुराउत्तरप्रदेश-281001
- 3 पुस्तक: व्याकरण प्रदिप - रामदेवप्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद-211024
- 4 पुस्तक: व्याकरण प्रदिप - रामदेवप्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024
- 5 प्रकाशक: दक्षिण भारत प्रचार सभा चेन्नई -17



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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
221TL1A1MA	MALAYALAM- I: MODERN LITERATURE	LANGUAGE-I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam 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 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				✓	✓
CO2					✓
CO3		✓	✓		✓
CO4		✓	✓	✓	✓
CO5		✓	✓		✓

<input checked="" type="checkbox"/> Skill Development	<input checked="" type="checkbox"/> Entrepreneurial Development
<input type="checkbox"/> Employability	<input checked="" type="checkbox"/> Innovations
<input checked="" type="checkbox"/> Intellectual Property Rights	<input checked="" type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input checked="" type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



221TL1A1MA	MALAYALAM- I: MODERN LITERATURE	SEMESTER I
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Novel 14 h

PathummayudeAdu

Unit II Novel 10 h

PathummayudeAdu

Unit III Short Story 14 h

Nalinakanthi

Unit IV Short Story 10 h

Nalinakanthi

Unit V Practical Application 12 h

Expansion of ideas, General Essay and Translation

Text Books


- 1 Vaikkam Muhammed Basheer, "PathummayudeAdu" (NOVEL), DC Books & Kottayam
- 2 T.Padmanabhan, "Nalinakanthi" (Short Story), DC Books & Kottayam.

References

- 1 MalayalaNovelSahithyam.
- 2 MalayalaCherukathaInnale Innu.



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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
221TL1A1FA	FRENCH- I: GRAMMAR, TRANSLATION AND CIVILIZATION	LANGUAGE - I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the 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
- 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	Apply the adjectives and the classroom environment in France	K2
CO3	Evaluate the Plural, Articles and the Hobbies	K3
CO4	Measure the Cultural Activity in France	K3
CO5	Select 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				✓	✓
CO2				✓	✓
CO3				✓	✓
CO4				✓	✓
CO5				✓	✓

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input checked="" type="checkbox"/>	Innovations
<input checked="" type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input checked="" type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



221TL1A1FA	FRENCH- I: GRAMMAR, TRANSLATION AND CIVILIZATION	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 	Encours 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 rapides et remplir de tâches d'appréciation.	<ul style="list-style-type: none"> • Dans une soirée de rencontres rapides comprendre des personnes qui échangent sur elles et sur leurs goûts • Comprendre une personne qui parle des goûts de quelqu'un d'autre.



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		
Demander à quelqu'un de faire quelque chose. Demander poliment. Parler d'actions passées. Tu veux bien?	Organiser un programme d'activités pour accueillir une personne importante.	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.

Unit V Practical Application

10 h

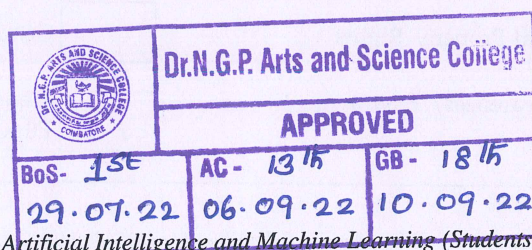
Make in Own Sentences

Text Book

- 1 Regine Merieux, Yves Loiseau, "LATITUDES - 1" (Page No: 9-55) (Méthode 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.



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Course Code	Course Name	Category	L	T	P	Credit
221EL1A1EA	PROFESSIONAL ENGLISH- I	LANGUAGE- II	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
- any spontaneous spoken discourse and respond to them with proper 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	Identify the various aspects in poetry	K2
CO2	Infer linguistic and non-linguistic features of the context for understanding and interpreting	K3
CO3	Construct sentences and convey messages effectively in real life situations	K3
CO4	Apply different reading strategies with varying speed	K3
CO5	Prepare modules with their own ideas and present them coherently in a grammatically correct form	K3

MAPPING WITH PROGRAMME OUTCOMES

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

<input checked="" type="checkbox"/> Skill Development	<input checked="" type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input checked="" type="checkbox"/> Innovations
<input checked="" type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input checked="" type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



221EL1A1EA	PROFESSIONAL ENGLISH- I	SEMESTER I
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies

12 h

Nissim Ezekiel: The Worm- Author's Biography- title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques- Annotations

Niyi Osundare: Our Earth Will Not Die- Author's Biography- title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques- Annotations

A. G. Gardiner: On Superstitions- Author's biography- Narrative structure- Exploration of the text- passage analysis- insight of ideas- cohesion and context- style- language techniques- Annotations

Nancy Bella: Clever Thief- Author's Biography- Plot Summary- Detailed summary and Analysis- Themes- Important Quotations- Characters- Description - analysis- Terms- Symbols- Critical analysis

H. G. Wells: The Truth about Pyecraft- Author's Biography- narrative structure- passage analysis- insight of ideas- cohesion and context- style- language techniques

Unit II Listening Skills

12 h

Listening vs. hearing- Types of listening, Tips to enhance Listening Skills, Non-verbal and Verbal signs of active listening - Comprehensive Listening - Listening to pre-recorded audios on speeches, interviews and conversations - Listening Activities- Listening and responding to complaints (formal situation), Listening to problems and offering solutions (informal)

Unit III Speaking Skills

14 h

Formal occasions- Introducing oneself, Introducing others, Enquiries and Seeking permission, Making short presentations - Informal occasions- Requests, Offering help, Congratulating, Farewell party, graduation speech - Giving instructions to do a task and to use a device, Giving and asking directions



Unit IV Reading Skills

10 h

Study Skills: Skimming and Scanning- Reading different kinds of texts- Types of reading-Developing a good reading speed, reading aloud, Referencing skill - Word Power (Denotation and Connotation) - Reading comprehension, Data interpretation -Charts, Graphs, Advertisements

Unit V Writing Skills

12 h

Sentence patterns, Note- making and note taking-Strategies - Paragraph writing: Structure and Principles - Academic Writing - Formal and Informal Letters, Report, Book /Movie Review

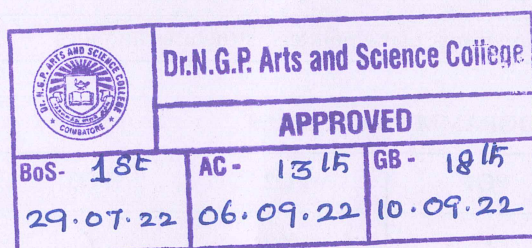
Text Books

- 1 Gardiner, A. G. 1926. Alpha of the Plough: Second series, J.M. Dent & Sons Ltd., London, United Kingdom. pg.no-151-156. (Unit I)
- 2 Ezekiel, Nissim. "The Worm," Crazy Romantic Love, www.mianmawaisarain.live/2020/05/poem-worm-nissim-ezekiel.html. Accessed 3 Aug. 2022. (Unit I)
- 3 <<http://livros01.livrosgratis.com.br/ln000835.pdf/>>(Unit I)
- 4 Mithra,S.M. 1919. Hindu Tales from the Sanskrit, Macmillan & Co Ltd., London, United Kingdom. pg.no-127-142. (Unit I)
- 5 Nation, I. S. P and Jonathan Newton. 2009. Teaching ESL/EFLListening and Speaking. Routledge, New York, United States. (Unit II)
- 6 Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. Sparkle. (1st Edn.) McGraw - Hill Education, Chennai, India. (Unit III- V)



References

- 1 Our Earth Will Not Die By NiyiOsundare." Studocu.Com, studocu.com/in/document/bangalore-university/bachelor-of-computer-applications/1586771577-our-earth-will-not-die/27675462. Accessed 3 Aug. 2022.
- 2 OnSuperstitions."THEHISTORIAN,thehistorian1947.wordpress.com/2019/03/08/on-superstitions-by-a-g-gardiner. Accessed 3 Aug. 2022.
- 3 Swales, John M. & Feak, Christine B. 2012. Academic Writing for Graduate Students: Essential Tasks and Skills, University of Michigan Press, Michigan.
- 4 Rudzka, Brygida -Ostyn, 2003. Word Power: Phrasal Verbs and Compounds: A Cognitive Approach, Mouton de Gruyter, New York, United States.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A1CA	PROBLEM SOLVING AND PROGRAMMING IN C	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental aspects of programming and problem solving
- The C language fundamentals
- The representation and working of arrays, pointers, functions and files

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Illustrate the basic principles of programming and problem solving	K2
CO2	Understand the fundamentals of C Language	K2
CO3	Implement decision making using branching and looping.	K3
CO4	Develop programs using arrays and functions	K3
CO5	Execute programs using pointers, structures and files	K3

MAPPING WITH PROGRAMME OUTCOMES

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

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



224AI1A1CA	PROBLEM SOLVING AND PROGRAMMING IN C	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Programming and Problem Solving 12 h

Introduction: Types of Programming Languages - High level Languages - Assembly Languages - Machine Level Languages - System Software - Operating Systems - Compiler - Linker and Interpreter. Problem Solving Strategies: Steps involved in problem solving - Algorithms - Flow Charts - Symbols used in Flow Charts - Pseudo Codes - Structured Programming - Sequence - Selection - Repetition - Modular Programming.

Unit II C Language Fundamentals 12 h

Language Fundamentals: Introduction to C - Basic Structure of C Program - Constants - Variables - Data Types - Operators - Expressions - Evaluation of Expressions - Operator Precedence and Associativity - Managing the Input and Output - Formatted I/O - Unformatted I/O - Storage classes- Simple programs for logic building.

Unit III Decision Making and Arrays 12 h

Branching: Simple if Statement - if-else statement - elseif Ladder - Switch statement - goto, break and continue statements. Looping: while loop - do-while loop -for loop- nested for loop - Pre-processor Directives: Macro substitution - File inclusion - Compiler control directives. Arrays: Introduction - Types of arrays - Declaration and Initialization of Arrays - Dynamic Arrays.

Unit IV Strings, Functions and Pointers 12 h

Strings: Declaring and Initializing the string variables - String handling functions. Functions - Need for functions - Elements of functions - Category of functions - Passing arrays to functions - Recursion. Pointers: Understanding Pointers - Declaration and Initialization of pointer variables - Accessing variables through pointers - Pointers and arrays.



Unit V Structures and Files

12 h

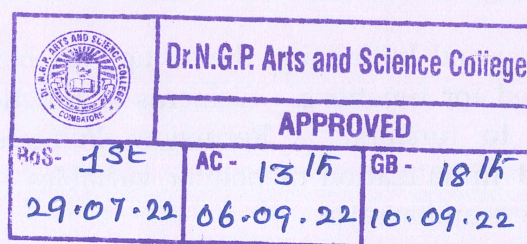
Structures: Defining a structure - Declaring structure variables - Accessing structure member - Array of structures - Structure within structures - Unions. Files: Defining and opening a File - Closing a file - I/O Operations on files - Dynamic memory allocation - Command Line Arguments.

Text Books

- 1 Ashok N. Kamthane, 2009, "Programming and Data Structures", 1st Edition, Pearson Education.
- 2 Byron Gottfried, 2018, "Schaum's Outline of Programming with C", 4th Edition, McGraw Hill Education.

References

- 1 E.Balagurusamy, 2017, "Programming in ANSI C", 7th Edition, TMH.
- 2 H. Schildt, 2000, "C: The Complete Reference", 4th Edition, TMH.
- 3 ReemaThareja , 2015, "Programming in C", 2nd Edition, Oxford University Press.
- 4 Anita Goel, Ajay Mittal, 2016, "Computer Fundamentals and Programming in C", 1st Edition, Pearson.



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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)


224AI1A1CP	CORE PRACTICAL:C PROGRAMMING	SEMESTER I
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Total Credits: 2

Total Instructions Hours: 48h

S.No	List of Experiments
1	Implement programs using I/O Statements.
2	Write programs with Operators in C.
3	Experiments using Conditional Statements.
4	Design programs using Looping Statements.
5	Implement One Dimensional and Two Dimensional Arrays in C.
6	Programs using Functions.
7	Implement the String handling functions in C.
8	Experiments using Pointers and storage classes.
9	Implement programs using Structures.
10	Programs using Dynamic memory allocation.
11	Create files using File handling in C.
12	Programs using Command line arguments.

Note: Out of 12 - 10 Mandatory

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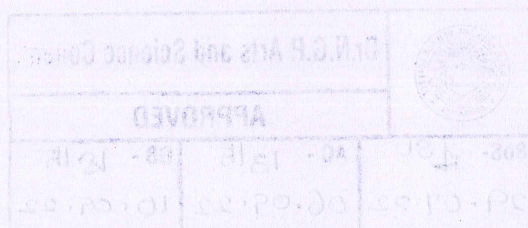
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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
224IT1A1CA	DIGITAL COMPUTER FUNDAMENTALS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of number system and circuits
- The principles of logic gates and memory
- The design and architecture of microprocessors and microcontrollers

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the types of number systems, Boolean Algebra	K2
CO2	Understand and analyze Logic gates	K2
CO3	Illustrate the concepts of combinational circuits	K3
CO4	Understand the different types of sequential logic and memory organization	K2
CO5	Understand the architecture of microprocessors and microcontrollers	K2

MAPPING WITH PROGRAMME OUTCOMES

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

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



224IT1A1CA	DIGITAL COMPUTER FUNDAMENTALS	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Binary Systems and Boolean Algebra 10 h

Binary Numbers- Number base conversions- Octal and Hexadecimal conversions- Complements- Binary codes - Decimal codes. Basic Definitions-Boolean functions- Canonical standard forms: Minterms and Maxterms - Sum of Minterms-Product of Maxterms-conversion between canonical forms.

Unit II Logic Gates and Boolean functions 8 h

Digital Logic Gates: AND, OR, Inverter, Buffer, NAND, NOT, Exclusive-OR, Exclusive-NOR. The Map method-Two and three-variable Maps-Four variable Map - Five and Six-Variable Maps- Product of Sum simplification - Don't care conditions.

Unit III Combinational Logic 10 h

Adders: Half-Adder, Full-Adder. Subtractors Half-Subtractor, Full-Subtractor. Multilevel NAND Circuits: Universal Gate. Multilevel NOR Circuits: Universal Gate. Binary Parallel Adder- Decimal Adder - BCD Adder. Decoders: Demultiplexers-Encoders - Multiplexer.

Unit IV Sequential Logic & Memory Unit 10 h

Introduction- Flip-flops-Clocked RS Flip-flop - D Flip-flop - JK Flip-flop - Design of Counters- Registers -Ripple Counters. The Memory Unit - Random Access Memories: Integrated-circuit Memory- Magnetic-core Memory.

Unit V Introduction to Microprocessors and Microcontrollers 10 h

Introduction - Microprocessor- Microcomputer- Architecture of Microprocessors- History- Evolution- Microprocessor Applications- Evolution of Microcontrollers- Application of Microcontrollers. Architecture of 8085 Microprocessor- Pin diagram of 8085 Microprocessor.




Text Books

- 1 M.Morris Mano, 2019, "Digital Logic and Computer Design", Pearson India Education.
- 2 Soumitra Kumar Mandal, 2018, "Microprocessors and Microcontrollers – Architecture, Programming and Interfacing using 8085, 8086, 8051", 15th Edition, Tata Mc Graw Hill Education.

References

- 1 S. Salivahanan and S Arivazhagan, 2018, "Digital Circuits and Design", 5th Edition, Oxford University Press, Noida
- 2 Thomas Floyd L., 2015, "Digital Fundamentals", 11th Edition, Pearson Publication Ltd, New Delhi
- 3 M Morris Mano, 2016, " Digital Logic and Computer Design", 5th edition, Pearson
- 4 Aditya P Mathur, 2016, "Introduction to Microprocessor", 3rd Edition, McGrawHill Education.

		
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Course Code	Course Name	Category	L	T	P	Credit
222MT1A1ID	MATHEMATICS FOR COMPUTING-I	IDC	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of matrices and determinants
- The technique of obtaining eigen values and eigen vectors
- The method of solving linear system of equations

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Define the various terms of matrices and the operations involved in it	K1
CO2	Identify the determinant value of matrices	K2
CO3	Determine the eigen values and eigen vectors through different methods	K3
CO4	Recognize the direct and indirect methods for solving algebraic equations	K1
CO5	Discuss the method of solving differential and integral problems	K2

MAPPING WITH PROGRAMME OUTCOMES

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

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



222MT1A1ID	MATHEMATICS FOR COMPUTING-I	SEMESTER I
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Systems of Linear Equations 13 h

Introduction to system of linear equations- - linear systems in two and three unknown - augmented matrices and elementary row operations - Gaussian elimination- Matrices and Matrix operations - inverses - algebraic properties of matrices - elementary matrices - method for finding A^{-1} - invertible matrices - diagonal matrices - triangular matrices - symmetric matrices

Unit II Determinants 12 h

Introduction - determinants by cofactor expansion- minors and cofactors - technique for evaluating 2×2 and 3×3 determinants - evaluating determinants by row reduction - elementary row operations - Matrices with proportional rows or columns - properties of determinants - Cramer's rule.

Unit III Eigenvalues and Eigenvectors 10 h

Definition of eigenvalues and eigenvectors - computing eigenvalues and eigenvectors - Diagonalization - Geometric and Algebraic multiplicity - complex vector spaces - vectors in C^n - differential equations - first order linear systems - solution by diagonalization

Unit IV Solution of Algebraic , Transcendental and Linear Systems of Equations 13 h

Introduction - Newton-Raphson method-Direct methods -Matrix inversion method - Gaussian elimination method - Gauss Jordan method Iterative methods - Gauss Seidel Method - Gauss Jacobi method

Unit V Interpolation, Numerical Differentiation and Integration 12 h

Introduction - Finite differences - Newton's formulae for interpolation - Interpolation with unevenly spaced points: Lagrange's interpolation formula- Numerical differentiation - maximum and minimum values of a tabulated Function - Numerical integration - Trapezoidal rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule.




Text Books

- 1 Howard Anton and Chris Rorres, 2015 "Elementary Linear Algebra with Supplemental Applications", 11th Edition, Wiley India Pvt. Ltd, New Delhi. (Unit I to III)
- 2 Sastry, S.S, 2012, "Introductory methods of Numerical Analysis", Prentice-Hall of India. New Delhi. (Unit IV to V)

References

- 1 Partha Karmakar, Chandan Bikash Das, Pabitra kumar Gouri, 2021 "Introduction to Linear Algebra", 1st Edition, Books and Allied(P) Ltd, Kolkata
- 2 Gilbert Strang, 2005, "Linear Algebra and its Applications", 4th Edition, Brooks/Cole, Noida.
- 3 Veerarajan.T,Ramachandran.T, 2004. "Theory and Problems in Numerical Methods With Programs in C and C++",10th Edition, Tata Mc- Graw Hill Publishing Company Limited,New Delhi.
- 4 Venkataraman,M.K. 2004,"Numerical Methods in Science and Engineering", 4th Edition,NPC

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Course Code	Course Name	Category	L	T	P	Credit
223MB1A1AA	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	Infer on Natural resources and its conservation	K2
CO3	Apply the knowledge on Biodiversity and its conservation	K3
CO4	Relate effects, causes and control of air, water, soil and noise pollution etc.,	K2
CO5	Build awareness about sustainable development and Environmental protection	K2

MAPPING WITH PROGRAMME OUTCOMES

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

<input type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



223MB1A1AA	ENVIRONMENTAL STUDIES	SEMESTER I
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Environmental studies & Ecosystems 5 h

Introduction to Environmental studies& Ecosystems: Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development. Ecosystem- Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession.

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

Natural Resources: Renewable and Non-renewable Resources: 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). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs.

Unit III Biodiversity and Conservation 5 h

Biodiversity and Conservation: 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.

Unit IV Environmental Pollution, Environmental Policies & Practices 5 h

Environmental Pollution, Environmental Policies & Practices: 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; Prevention & Control of Pollution Act – Air & Water. Wildlife Protection Act; Forest Conservation Act;



Unit V Human Communities and the Environment & Field Work 4 h

Human Communities and the Environment & Field Work: Human population and growth: Impacts on environment, human health and welfares. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness. Visit to an area to document environmental assets; river/forest/flora/fauna, etc. Population explosion - Family Welfare Programmes. Role of Information Technology in Environment and human health. Role of the Colleges, Teachers and Students in village adoption towards clean, green and make in villages in various aspects.


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.

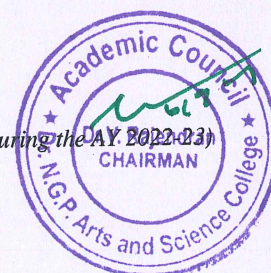
References

- 1 Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge
- 2 Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press
- 3 Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006
- 4 Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
- 5 McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books
- 6 McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century
- 7 Odum, E.P., Odum, h.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.

29/7/22
 B.Sc. Chairman / HoD
 Department of Artificial Intelligence and Machine Learning
 Dr. N.G.P. Arts and Science College
 Coimbatore - 641 048.

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A2TA	TAMIL - II : ARA ILAKKIYAM	LANGUAGE-I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு நாகரீகம், 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	வாழ்க்கைத் திறன்கள் (Life Skills) - மாணவர்களின் செயலாக்கத் திறனை ஊக்குவித்தல்	K1
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K2
CO4	சூழலியல் ஆக்கம் (Ecology)	K3
CO5	மொழி அறிவு (Tamil knowledge)	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221TL1A2TA	TAMIL - II : ARA ILAKKIYAM	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I அற இலக்கியம் 13 h

1. இலக்கிய வரலாறு - பதினெண் கீழ்க்கணக்கு நூல்கள்

2. திருக்குறள்

அ. அறன்வலியுறுத்தல் - அ. எண் 04

ஆ. நட்பாராய்தல் - அ. எண் 80

இ. நாடு - அ. எண் 74

ஈ. குறிப்பறிதல் - அ. எண் 110

Unit II அற இலக்கியம் 13 h

1. நாலடியார் - அறிவுடைமை

2. முதுரை - ஓளவையார் - 10 பாடல்கள்- 6,7,9,10,14,16,17,23,26,30

3. இனியவை நாற்பது - பூதஞ்சேந்தனார் - முதல் 10 பாடல்கள்

Unit III அறநெறிக் கட்டுரைகள் 09 h

1. இலக்கியவரலாறு - தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்

2. கலைகள் - உ.வே.சா

3. சங்க நெறிகள் - வ.சுப. மாணிக்கம்

Unit IV அறநெறிக் கட்டுரைகள் 15 h

1. வீர வணக்கம் - க. கைலாசபதி

2. தமிழர் பண்பாடு - டாக்டர் சோ.நா. கந்தசாமி

3. இணையத் தமிழ் வளர்ச்சி - முனைவர் ப.அர. நக்கீரன்

Unit V பயிற்சிப் பகுதி 10 h

1. இலக்கணம் - வழு, வழுவமைதி, வழாநிலை

2. அலுவலகம் சார்ந்த கடிதம் - விண்ணப்பங்கள், வேண்டுகோள், முறையீடு

3. படைப்பாக்கம் - பொதுத் தலைப்பில் கட்டுரைகள் எழுதுதல்




Text Book

- 1 தமிழ் மொழிப்பாடம்- 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. (Unit I to V)

References

- 1 பேராசிரியர் புலவர் சோம. இளவரசு, எட்டாம் பதிப்பு- 2014, தமிழ் இலக்கிய வரலாறு- மணிவாசகர் பதிப்பகம், சென்னை.
- 2 பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு - 2013, இலக்கணம்- இலக்கிய வரலாறு- மொழித்திறன்- பூவேந்தன் பதிப்பகம், சென்னை. .
- 3 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY
வலைதள முகவரி : <https://www.tamilvu.org>

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A2HA	HINDI- II: MODERN LITERATURE	LANGUAGE- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- 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					✓
CO2	✓	✓		✓	
CO3					
CO4	✓	✓	✓	✓	✓
CO5				✓	✓

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input checked="" type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input checked="" type="checkbox"/> Innovations
<input checked="" type="checkbox"/> Intellectual Property Rights	<input checked="" type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input checked="" type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



221TL1A2HA	HINDI - II: MODERN LITERATURE	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I	13 h
आधुनिक पद्य – शबरी (श्री नरेश मेहता)	
Unit II	13 h
उपन्यास: सेवासदन-प्रेमचन्द	
Unit III	12 h
कहानी-किरीट- डा उषा पाठक / डा अचला पाण्डेय	
पाठ 1.कफ़न, 3. चीफ़ की दावत	
Unit IV	12 h
पत्र लेखन: (औपचारिक या अनौपचारिक)	
Unit V	10 h
अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में) (पाठ 1 to 10)	

Text Books

- 1 प्रकाशक: लोकभारती प्रकाशन पहली मंजिल, दरबारी बिल्डिंग, महात्मा गाँधी मार्ग, इलाहाबाद. (Unit I)
- 2 प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्टमेंट्स, 15 हेस्टिंग्स रोड अशोक नगर इलाहाबाद. (Unit II)
- 3 प्रकाशक: राधाकृष्ण प्रकाशन दिल्ली. (Unit III)
- 4 पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद. (Unit IV)
- 5 प्रकाशक: दक्षिण भारत प्रचार सभा चेन्नई. (Unit V)



Course Code	Course Name	Category	L	T	P	Credit
221TL1A2MA	MALAYALAM - II: MODERN LITERATURE	LANGUAGE- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam 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 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					✓
CO2	✓	✓		✓	
CO3					
CO4	✓	✓	✓	✓	✓
CO5				✓	✓

COURSE FOCUSES ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221TL1A2MA	MALAYALAM- II: MODERN LITERATURE	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus


Unit I	Novel	12 h
Enmakaje: Chapter 1- Chapter 5		
Unit II	Novel	10 h
Enmakaje: Chapter 6- Chapter 10		
Unit III	Novel	12 h
Enmakaje: Chapter 11- Chapter 15		
Unit IV	Autobiography	14 h
Neermathalam Pootha Kalam : Chapter 1- Chapter 10		
Unit V	Autobiography	12 h
Neermathalam Pootha Kalam: Chapter 11- Chapter 20		

Text Books

- 1 Ambika Suthan Mangad, Enmakaje (Novel), DC Books Kottayam, Kerala, India. (Unit I to III)
- 2 Madhavikkutty, Neermathalam Pootha Kalam (Autobiography), DC Books Kottayam, Kerala, India. (Unit IV & V)

References

- 1 Malayala Novel Sahithyam, DC Books Kottayam, Kerala, India.
- 2 Malayala Sahithya Charithram, National Books Kottayam, Kerala, India.

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A2FA	FRENCH - II: GRAMMAR, TRANSLATION AND CIVILIZATION	LANGUAGE-I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the 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
- 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	Apply the adjectives and the classroom environment in France	K2
CO3	Evaluate the Plural, Articles and the Hobbies	K3
CO4	Measure the Cultural Activity in France	K3
CO5	Select 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				✓	✓
CO2				✓	
CO3				✓	✓
CO4			✓	✓	✓
CO5				✓	✓

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input checked="" type="checkbox"/>	Innovations
<input checked="" type="checkbox"/>	Intellectual Property Rights	<input checked="" type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input checked="" type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



Unit IV

14 h

Demander et indiquer une direction. Localiser (près de, en face de). Exprimer l'obligation l'interdit. Conseiller.	Suivre un itinéraire à l'aide d'indications par téléphone et d'un plan. Par courrier électronique, donner des informations et des conseils à un ami qui veut voyager.	Comprendre des indications de direction. Comprendre des indications de lieu. 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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Unit V

10 h

Make in Own Sentences

Text Book

- 1 Regine Merieux, Yves Loiseau, "LATITUDES - 1" (Page No: 56-101) (Methode de Français), Goyal Publisher & Distributors Pvt.Ltd., 86 UB Jawahar Nagar (Kamala Nagar), New Delhi-7 Les Editions Dider, Paris, 2008- Imprime en Roumanie par Canale en Janvier 2012. (Unit I to IV)

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221TL1A2FA	FRENCH- II: GRAMMAR, TRANSLATION AND CIVILIZATION	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I

12 h

Proposer, accepter, refuser une invitation. Indiquer la date.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendre un message d'invitations sur une réponse téléphonique. Inviter quelqu'un accepter ou refuser l'invitation.
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Unit II

12 h

Prendre et fixer un rendez-vous. Demander et indiquer l'heure.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendre des personnes qui fixent un rendez-vous par téléphonique. Prendre un rendez-vous par téléphone
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Unit III

12 h

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.	Exprimer son point de vue sur les idées de cadeau. Faire des achats dans un magasin
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Course Code	Course Name	Category	L	T	P	Credit
221EL1A2EA	PROFESSIONAL ENGLISH - II	LANGUAGE- II	4	-	1	3

PREAMBLE

This course has been designed for students to learn and understand

- the language for specific purposes through various literary manuscripts
- the process of communicative competences in academics through authentic contexts
- the different formats of business correspondence with lucidity and accuracy via various media

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn to appreciate the works of eminent writers from various genres	K1
CO2	Construct and comprehend complex situational talks	K3
CO3	Identify formal and informal communicative context to speak fluently	K3
CO4	Infer the denotative and connotative meanings while reading specialized texts	K2
CO5	Develop the skill of writing through descriptions, narrations and essays	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221EL1A2EA	PROFESSIONAL ENGLISH - II	SEMESTER II
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Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies 12 h

John Keats: La Belle Dame Sans Merci - Author's Note - title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques- Annotations

A. G. Gardiner: On Keyhole Morals- Author's Note- Title indications- Outline - Passage Analysis - context of the Prose - Narrative techniques- Style

Charles Lamb: A Dissertation upon Roast Pig- Author's Note - title indications- outline- paraphrasing the Essay- context of Essay- form- devices- Narrative techniques

John Galsworthy: The Silver Box - Author's Note- Plot Summary- Critical Analysis- Themes- Characters- Description - analysis- Terms- Symbols

Unit II Listening Skills 10 h

Listening to Talks/Lectures by Specialists on selected subject specific topics- Listening to Public Announcements- Listening to Instructions & Directions- Listening to Speeches- Listening to process/event descriptions to identify cause & effects

Unit III Speaking Skills 14 h

Small Talk- Mini Presentations and Making Recommendations- Group Discussions, Debates, and Expressing opinions through Role play- Picture Description- Giving Instruction to Use a Product- Presenting a Product- Summarizing a Lecture- Narrating Personal Experiences/ Events- Interviewing a Celebrity- Scientific Lectures- Educational Videos- Debates- Different Viewpoints on an Issue

Unit IV Reading Skills 12 h

Reading Biographies, Newspaper Reports, Technical Blogs- Reading Advertisements- Gadget Reviews - Newspaper Articles- Journal Reports- Reading Editorials & Blogs- Case Studies- Excerpts from Literary Texts.



Unit V Writing Skills

12 h

Inferring & Interpreting- Predicting Reorganizing Material- Summary Writing Based on the Reading Passages- Writing – Emails & Essay Writing (Descriptive or narrative)- Grammar - Tenses- Question Types: Wh/ Yes or No/ and Tags.

Text Books

- 1 <<https://www.poetryfoundation.org/poems/44475/la-belle-dame-sans-merci-a-ballad/>> (Unit I)
- 2 <<https://sittingbee.com/on-keyhole-morals-a-g-gardiner/>> (Unit I)
- 3 <<https://www.gradesaver.com/charles-lamb-essays/study-guide/summary-a-dissertation-upon-roast-pig/>> (Unit I)
- 4 <<https://public-library.uk/ebooks/41/61.pdf>- The Silver Box- John Galsworthy/> (Unit I)
- 5 Hart, Steve, Aravind R. Nair, Veena Bhambhani. 2016. Embark: English for Undergraduates. Cambridge University Press, New Delhi, India. (Unit II)
- 6 Lakshminarayanan. 2012. A Course Book On Technical English. Scitech Publications Pvt. Ltd, New Delhi, India. (Unit III)
- 7 Raman, Meenakshi & Sangeeta Sharma. 2016. Technical Communication- Principles And Practice, Oxford University Press, New Delhi, India. (Unit IV)
- 8 Viswamohan, Aysha. 2017. English For Technical Communication (With CD), McGraw Hill (India) Private Limited, New Delhi, India. (Unit V)

References

- 1 Bajwa and Kaushik. 2010. Springboard to Success- Workbook for Developing English and Employability Skills. Orient Black Swan, Chennai, India.
- 2 Chellammal, V. 2003. Learning to Communicate. Allied Publishing House, New Delhi, India.
- 3 Krishnaswamy. N, Lalitha Krishnaswamy & B.S. Valke. 2015. Eco English, Learning English through Environment Issues. An Integrated, Interactive Anthology. Bloomsbury Publications, New Delhi, India.
- 4 Syamala. V. 2002. Effective English Communication for You. Emerald Publishers, Chennai, Tamil Nadu, India.



Course Code	Course Name	Category	L	T	P	Credit
224CA1A2CA	DATA STRUCTURES	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Fundamental concept of data structure with effective utilization of space and time
- Linear and nonlinear data structures
- Different Searching, Sorting and Hashing 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 of data structures and algorithmic complexity	K2
CO2	Demonstrate the operations of Stack and Queue and their applications	K2
CO3	Implement operations on linked list and its variants	K3
CO4	Apply non linear data structures such as trees and graphs in problem solving	K3
CO5	Analyze the various sorting, searching algorithms and hashing techniques	K4

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics




Text Books

- 1 Reema Thareja, 2018, "Data Structures using C", Second Edition, Oxford University Press.
- 2 G A V Pai, 2017, "Data Structures and Algorithms: Concepts - Techniques and Applications", McGraw Hill Education.

References

- 1 Mark Allen Weiss, 2014, "Data Structures and Algorithm Analysis in C++", Third Edition, Pearson education.
- 2 Yashavant Kanetkar, 2003, "Data Structure Through C++ Paperback", 4th Edition, BPB Publications.
- 3 Lipchitz (Schaum's Outline Series), 2010, "Data Structures with C", McGraw Hill Education.
- 4 https://www.tutorialspoint.com/data_structures_algorithms/index.htm

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224CA1A2CA	DATA STRUCTURES	SEMESTER II
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Data Structures and Arrays 10 h

Introduction: Basic Terminology -Classification of Data Structures -Operations on Data Structures-Abstract Data Type-Algorithms-Time and Space Complexity -Big O Notation-Omega Notation (Ω) -Theta Notation (Θ). Arrays: Declaration of Arrays-Accessing the elements of an array-Storing values in Arrays-Operations on Arrays. Applications of Arrays: Sparse Matrices

Unit II Stacks and Queues 12 h

Stacks: Array Representation of Stacks- Operations on a Stack-Linked Representation of Stacks. Applications of Stacks: Evaluation of Arithmetic Expressions -Recursion. Queues: Array Representation of Queues - Operations on Queues -Linked Representation of Queues - Circular Queues. Applications of Queues: JOB Scheduling

Unit III Linked Lists 12 h

Singly Linked Lists: Inserting a node in a Linked List- Deleting a node from a Linked List. Circular Linked Lists: Inserting a node in a Circular Linked List - Deleting a node from a Circular Linked List. Doubly Linked Lists: Inserting a node in a Doubly Linked List - Deleting a node from a Doubly Linked List. Applications of Linked Lists: Polynomial Addition

Unit IV Trees and Graphs 14 h

Trees: Binary Trees - Representation of Binary Trees -Creating a Binary Tree - Traversing a Binary Tree- Binary Search Trees and its Operations - Threaded Binary Trees. Applications of Trees: Expression Trees. Graphs: Graph Terminology - Representation of Graphs - Graph Traversal Algorithms.Applications of Graphs: Shortest Path Algorithm: Dijkstra's Algorithm. Minimum Spanning Trees : Prim's Algorithm

Unit V Searching , Sorting and Hashing 12 h

Searching: Linear search -Binary Search. Sorting: Bubble Sort - Insertion Sort - Selection Sort - Quick Sort-Merge Sort -Heap Sort. Hashing and Collision: Hash Tables - Hash Functions - Collision. Applications of Hashing: Keyword Table in a Compiler.



Course Code	Course Name	Category	L	T	P	Credit
224CS1A2CA	OBJECT ORIENTED PROGRAMMING WITH C++	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The object oriented programming principles
- The structure and features of C++
- The design and implementation of OOPs concepts using C++

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 object oriented programming and basic constructs of C++ programming	K1
CO2	Design simple applications using classes and objects	K2
CO3	Illustrate the concept of Inheritance and apply pointers and strings	K3
CO4	Apply polymorphism and exception handling in program design	K3
CO5	Implement programs using File Management and STL	K4

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224CS1A2CA	OBJECT ORIENTED PROGRAMMING WITH C++	SEMESTER II
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Object Oriented Programming 8 h

Introduction - Programming Paradigms - Key concepts of Object-Oriented Programming - Applications of Object-Oriented Programming - Variable, Value and Constant - Components of a C++ Program - Data Types - Expressions - Type Conversion - Order of Evaluation - Formatting Data: Manipulators in Input/Output- Branching and Looping.

Unit II Classes and Arrays 10 h

User-Defined Types: Classes-Class Definition-Member function- Access Modifiers- Inline function- Constructors and Destructors- Instance Members: Instance Data Members-Instance Member Functions -Static Members - Arrays: One-Dimensional Arrays - Multidimensional Arrays. Case Study: Wave Array

Unit III Pointers, Strings and Inheritance 10 h

References - Pointers - Pointer Types and Pointer variables - Constant Modifiers - Pointer to Pointer- Arrays and Pointers - Strings: C ++ String Class -C++ String Library - Inheritance: Private, Public and Protected Inheritance - Association - Dependency

Unit IV Polymorphism and Exception Handling 10 h

Polymorphism- Binding- Abstract Class : Pure Virtual Functions - Multiple Inheritance - Overloading Principles - Overloading as Member- Nonmember: Friend function-Exception Handling : Approach- Exceptions in Classes - Standard Exception Classes - Templates: Function Template - Class Template.

Unit V File Handling and Standard Template Library 10 h

Input and Output stream - Stream Classes - Console Streams - Console Objects - Stream State - File Streams - File I/O - Opening Modes - Sequential Vs Random Access - String Streams - Formatting Data: Direct use of Flags, Fields and Variables - Predefined Manipulators-Standard Template Library: Iterators, Sequence Containers, Container Adapters.




Text Books

- 1 Ashok Kamthane, 2017, "Object-Oriented Programming with ANSI and Turbo C++ 3rd Edition", Pearson (Unit 1.1 to 1.3).
- 2 Behrouz A. Forouzan, Richard F. Gilberg, 2020, "C++ Programming: An Object-Oriented Approach", McGraw-Hill Education (Unit I to V).

References

- 1 Bjarne Stroustrup, 2022, "C++ Programming Language, Fourth Edition" Pearson.
- 2 E Balagurusamy, 2020, "Object-Oriented Programming with C++, 8th Edition", McGraw Hill Education
- 3 M. Ashwin, V. Sreeprada, M. Santhosh, 2022, "A Hand Book on C++ Programming", Notion Press
- 4 Yashavant Kanetkar, 2020, "Let Us C++", BPB Publications.
- 5 <https://www.codecademy.com/>
- 6 <https://www.simplilearn.com/>

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224AI1A2CP	CORE PRACTICAL: DATA STRUCTURES AND C++	SEMESTER II
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Total Credits: 2

Total Instructions Hours: 48h

S.No	List of Experiments
1	Programs using Classes and Objects.
2	Programs using Constructors and Destructors.
3	Illustrate how the following forms of inheritance are supported a) Single inheritance b) Multiple inheritance c) Multi level inheritance d) Hierarchical inheritance
4	Demonstrate Friend Functions and Exception handling.
5	Demonstrate the Operator Overloading and Function Overloading.
6	Implement the Linear and Binary Search Algorithm.
7	Implement the Stack Operations using arrays.
8	Demonstrate the Queue operations using arrays.
9	Create a Singly Linked list and perform insertion and deletion.
10	Programs using Internal Sorting.
11	Programs using External Sorting.
12	Implementation of Graph Traversal - BFS and DFS.

Note: Out of 12 - 10 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
222MT1A2ID	MATHEMATICS FOR COMPUTING- II	IDC	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concepts of probability theory and distribution
- the method of finding the moments of a random variable
- the method of checking the validity of parameters through test statistic

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	State the basic concepts of probability theory	K1
CO2	Discuss the concept of discrete and continuous distribution	K2
CO3	Define the parameters of central tendencies and dispersion	K2
CO4	Demonstrate the applications of correlation and regression	K3
CO5	Analyze the validity of the values of parameters through hypothesis testing	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



222MT1A2ID	MATHEMATICS FOR COMPUTING- II	SEMESTER II
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Elementary probability and Random variable 11 h

Random experiment - De-Morgan's laws - conditional probability - generalization of multiplicative law - Bayes' probabilities - random variable - discrete and continuous random variable - distribution function - discrete probability distribution and function - mathematical expectation - moments - moment generating function - characteristic function - cumulants.

Unit II Probability Distribution 12 h

Binomial distribution - Bernoulli's theorem - Poisson distribution and Poisson variate X - relationship between the probabilities, $P(X=x)$ and $P(X=x+1)$ - Hypergeometric distribution - Normal and Lognormal distribution - Beta, Gamma and Exponential distribution - Weibull distribution

Unit III Measures of Central tendency and Dispersion 13 h

Characteristics of a good measure of central tendency - mean - arithmetic Mean - pooled mean - geometric Mean - harmonic mean - median - mode.

Measures of dispersion - purposes - properties - range - interquartile range - mean deviation - variance - standard deviation - coefficient of variation.

Unit IV Correlation and Regression 12 h

Scatter diagram - least square method - properties - regression line of X on Y - regression coefficient from coded data - correlation methods - graphical method - correlation coefficient - correlation in grouped bivariate data - relationship between correlation coefficients and regression coefficients - rank correlation.

Unit V Test of Significance and t-Test 12 h

Types of hypothesis - two types of errors - level of significance - critical region - one and two tailed test - size and power of a test - randomized test - non randomized test - degrees of freedom - student's t -test - test of equality of two population means - paired t -test - interval estimation - large sample tests - tests of hypothesis for proportions.

Note: Distribution of marks 80% Problem and 20% Theory




Text Books

- 1 Agarwal B. L, 2013, "Basic Statistics", 6th Edition, New age International(P) Limited publishers, New Delhi.

References

- 1 Gupta C.B and Vijay Gupta, 2007, "An Introduction to Statistical Methods", 23rd Edition, S. Chand & Co, New Delhi.
- 2 Sanchetti, D.C. Kapoor, V.K, 2010 "Statistics", 7th Edition, S. Chand & Co, New Delhi.
- 3 Veerarajan. T, 2017, "Fundamentals of Mathematical Statistics", 1st Edition, Yes Dee Publishing Pvt Ltd, Chennai.
- 4 Sivaramakrishna Das. P, Vijayakumar.C, 2020, "Probability and Statistics", 2nd Edition, Pearson Education, Noida.

		
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221TL1A2AA	PART-IV : BASIC TAMIL	SEMESTER II
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

இளங்கலை 2022 – 23ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது
(10 மற்றும் 12 – ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு)

(பருவத் தேர்வு இல்லை)

Syllabus

Unit I	தமிழ் மொழியின் அடிப்படைக் கூறுகள்	05 h
	எழுத்துகள் அறிமுகம்	
	1. உயிர் எழுத்துக்கள் - குறில் , நெடில் எழுத்துகள்	
	2. மெய் எழுத்துக்கள் - வல்லினம், மெல்லினம், இடையினம்	
	3. உயிர்மெய் எழுத்துக்கள்	
	4. பயிற்சி	
Unit II	சொற்களின் அறிமுகம்	05 h
	1.பெயர்ச்சொல்	
	2.வினைச்சொல் – விளக்கம் (எ.கா.)	
	3.பயிற்சி	
Unit III	குறிப்பு எழுதுதல்	05 h
	1. பெயர், முகவரி, பாடப்பிரிவு , கல்லூரியின் முகவரி	
	2. தமிழ் மாதங்கள்(12), வாரநாட்கள்(7)	
	3. எண்கள் (ஒன்று முதல் பத்து வரை), வடிவங்கள், வண்ணங்கள்	
Unit IV	குறிப்பு எழுதுதல்	05 h
	1. ஊர்வன, பறப்பன, விலங்குகள்	
	2.மனிதர்களின் உறவுப்பெயர்கள்	
	3. ஊர்களின் பெயர்கள் (எண்ணிக்கை 10)	



Unit V பயிற்சிப் பகுதி

04 h

பயிற்சிப் பகுதி (உரையாடும் இடங்கள்)

வகுப்பறை, பேருந்து நிலையம், சந்தை - பேசுதல், எழுதுதல்.

Notes:

அக மதிப்பீட்டுத் தேர்வு - வினாத்தாள் அமைப்பு முறை
பகுதி - அ

மொத்த மதிப்பெண்கள் - 50

சரியான விடையைத் தேர்வு செய்தல்

10x2=20

பகுதி - ஆ

சரியா? தவறா?

10x2=20

பகுதி - இ

ஒரு பக்க அளவில் விடையளிக்க

1x10=10

குறிப்பு:


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

Text Book

- 1 அறிவியல் கல்லூரி, கோயம்புத்தூர் - 641048, வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. (Unit I to IV)

References

- 1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம், சென்னை.
- 2 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY
வலைதள முகவரி : <https://www.tamilvu.org>.

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221TL1A2AB	PART - IV : ADVANCED TAMIL	SEMESTER II
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Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2022- 2023 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது
(10 மற்றும் 12 - ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது)
(பருவத் தேர்வு இல்லை)
Syllabus

Unit I கவிதைகள் 06 h

- 1.தமிழ்நாடு - பாரதியார்
- 2.மனதில் உறுதி வேண்டும் - பாரதியார்
3. இன்பத்தமிழ் - பாரதிதாசன்
- 4.வேலைகளல்ல வேள்விகள் - தாராபாரதி
- 5.தமிழா! நீ பேசுவது தமிழா! - காசியானந்தன்
6. நட்புக் காலம் (10 கவிதைகள்) - அறிவுமதி கவிதைகள்

Unit II கட்டுரை 05 h

கட்டுரைத் தொகுப்பு - நல்வாழ்வு - டாக்டர் மு.வரதராசன்

1. நம்பிக்கை
2. புலனடக்கம்
3. பண்பாடு

Unit III இலக்கணம் 04 h

- 1.வல்லினம் மிகும் மற்றும் மிகா இடங்கள்
2. ர,ற,ல,ழ,ள,ந,ண,ன - வேறுபாடு அறிதல்

Unit IV கடிதங்கள் 05 h

1. பாராட்டுக் கடிதம்
2. நன்றிக் கடிதம்
3. அழைப்புக் கடிதம்
4. அலுவலக விண்ணப்பங்கள்

Unit V பயிற்சிப் பகுதி 04 h

படைப்பாக்கப் பகுதி

பொதுத் தலைப்புகளில் கவிதை, கட்டுரை எழுதச் செய்தல்



Notes

அக மதிப்பீட்டுத் தேர்வு - வினாத்தாள் அமைப்பு முறை

மொத்த மதிப்பெண்கள் - 50

பகுதி - அ

சரியான விடையைத் தேர்வு செய்தல்

10x1=10

பகுதி - ஆ

கோடிட்ட இடங்களை நிரப்புக.

10x2=20

பகுதி - இ

இரண்டு பக்க அளவில் விடையளிக்க

2x10=20

குறிப்பு:

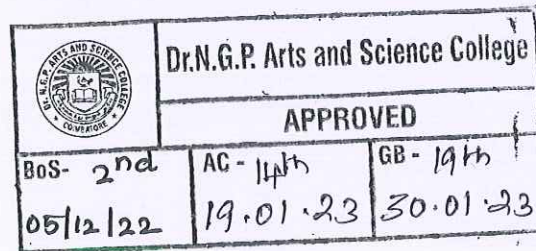
- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ -க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அமைதல் வேண்டும்

Text Book

- 1 சிறப்புத் தமிழ் - 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. (Unit- I to IV)

References

- 1 பேராசிரியர் புலவர் சோம. இளவரசு, எட்டாம் பதிப்பு. 2014. தமிழ் இலக்கிய வரலாறு - மணிவாசகர் பதிப்பகம், சென்னை.
- 2 டாக்டர் மு.வரதராசன். 2010. நல்வாழ்வு, பாரி நிலையம், சென்னை.
- 3 பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு. 2013. இலக்கணம் - இலக்கிய வரலாறு - மொழித்திறன் - பூவேந்தன் பதிப்பகம், சென்
- 4 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY
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Course Code	Course Name	Category	L	T	P	Credit
225CR1A2AA	HUMAN RIGHTS AND WOMEN'S RIGHTS	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- Concepts of Human Rights
- Human Right Violations and Redressal Mechanism
- rights to Women and Child

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 Rights	K1
CO2	Describing Fundamental Rights	K2
CO3	Impart knowledge on Human Right Violations and Redressal Mechanism.	K4
CO4	Extend a comprehensive knowledge on Rights to Women and Child	K3
CO5	Analyze the knowledge on Civil and Political Rights of Women	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input checked="" type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input checked="" type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



225CR1A2AA	HUMAN RIGHTS AND WOMEN'S RIGHTS	SEMESTER II
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Human Rights 04 h

Meaning - Definition - Nature - Content - Legitimacy of Human Rights - Origin and Development of Human Rights - Theories - Principles of Magna Carta - Modern Movements of Human Rights - The Future of Human Rights.

Unit II Human Rights in India 05 h

The Constitution of India - Fundamental Rights - Right to Life and Liberty - Directive Principles of State Policy - Fundamental Duties - Individual and Group Rights - Other facets of Human Rights - Measures for Protection of Human Rights in India.

Unit III Human Right Violations and Redressal Mechanism 05 h

Human Rights - Infringement of Human Right by State Machinery and by Individual - Remedies for State action and inaction - Constitutional Remedies - Public Interest Litigation (PIL) - Protection of Human Rights Act, 1993 - National Human Rights Commission - State Human Rights Commissions - Constitution of Human Right Courts.

Unit IV Rights to Women and Child 05 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 - Constitutional Rights - Personal Laws - Protection of children against Sexual Offences Act 2012 (POCSO).

Unit V Civil and Political Rights of Women 05 h

Right of Inheritance - Right to live with decency and dignity - The Married women's Property Act 1874 - 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.



Text Books


- 1 Lalit Parmar, 1998, "Human Rights", Anmol Publications Pvt. Limited, New Delhi.
- 2 Krishna Pal Malik, 2009, "Women & Law ", Allahabad Law University, New Delhi.

References

- 1 Mandagadde Rama Jois, 2015, "Human Rights", Bharatiya Values, Bharatiya Vidya Bhavan Publications, Mumbai.
- 2 Paras Diwan and Piyush Diwan, 1994, "Women and Legal Protection", South Asia Books, Andhra Pradesh.
- 3 Venkataram and Sandhiya. N, 2001, "Research in Value Education", APH Publishing Corporation, New Delhi.
- 4 Anand A S, 2008, "Justice for Women: Concerns and Expressions", Universal Law Publishing Co., New Delhi.

 5/12/22

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Course Code	Course Name	Category	L	T	P	Credit
221TL1A3TA	TAMIL - III	LANGUAGE - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம், 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) - மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K2
CO4	சூழலியல் ஆக்கம் (Ecology)	K3
CO5	மொழி அறிவு(Tamil knowledge)	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221TL1A3TA	TAMIL - III	SEMESTER III
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I காப்பியங்கள் 10 h

1. சிலப்பதிகாரம் - வழக்குரை காதை
2. மணிமேகலை - ஆதிரை பிச்சையிட்ட காதை

Unit II காப்பியங்கள் 10 h

1. கம்பராமாயணம் - கும்பகர்ணன் வதைப்படலம்: பா. எண் : 60 முதல் - 100 வரை
2. பெரிய புராணம் - அதிபத்த நாயனார் புராணம்

Unit III சிற்றிலக்கியங்கள் 10 h

1. திருக்குற்றாலக்குறவஞ்சி - வசந்தவல்லி பந்தாடிய சிறப்பு (6: 4 கண்ணிகள்)
2. கலிங்கத்துப்பரணி- களம் பாடியது: போர்க்களக் காட்சி- பா.எண்: 472 முதல்- 502 வரை

Unit IV இலக்கிய வரலாறு 10 h

1. காப்பியங்களின் தோற்றமும் வளர்ச்சியும்
2. சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும்
3. நாடகத்தின் தோற்றமும் வளர்ச்சியும்

Unit V இலக்கணம் & பயிற்சிப் பகுதி 08 h

அ. இலக்கணம்

1. 'பா' வகைகள் : வெண்பா, ஆசிரியப்பா, கலிப்பா, வஞ்சிப்பா - பொது இலக்கணம் மட்டும்.
2. அணி: உவமையணி, உருவக அணி, இல்பொருள் உவமையணி விளக்கம், உதாரணம்.

ஆ. பயிற்சிப் பகுதி

1. வாசகர் கடிதம் : நாளிதழ், வானொலி, செய்தி ஊடகங்களுக்கு



விமர்சனம் எழுதுதல்

2.திரைக்கதை : மத்திய மற்றும் மாநில அரசு விருது பெற்ற தமிழ்த் திரைப்படங்கள் மட்டும்

Text Book

- 1 தமிழ் மொழிப்பாடம் - 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என். ஜி. பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. (Unit I to V)

References

- 1 பேராசிரியர் புலவர் சோம. இளவரசு, எட்டாம் பதிப்பு - 2014, தமிழ் இலக்கிய வரலாறு- மணிவாசகர் பதிப்பகம், சென்னை.
- 2 பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு- 2013, இலக்கணம் - இலக்கிய வரலாறு - மொழித்திறன் - பூவேந்தன் பதிப்பகம், சென்னை. .
- 3 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY. வலைதள முகவரி: <https://www.tamilvu.org>



Course Code	Course Name	Category	L	T	P	Credit
221TL1A3HA	HINDI - III	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- 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	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input checked="" type="checkbox"/>	Innovations
<input checked="" type="checkbox"/>	Intellectual Property Rights	<input checked="" type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input checked="" type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



221TL1A3HA	HINDI - III	SEMESTER III
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

पद्य – काव्य पराशर (भोलानाथ)

(प्राचीन- कबीर, तुलसी, सुर, मीरा, आधुनिक- मैथिलीशरण गुप्त, अरूण कमल)

Unit II 10 h

हिन्दी साहित्य का इतिहास: (साधारण ज्ञान)

Unit III 10 h

अलंकार: अनुप्रास, यमक, श्लेष, वक्रोक्ति, उपमा, रूपक

Unit IV 10 h

संवाद लेखन

Unit V 08 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में)

(पाठ 10 to 20)

Text Books

- 1 प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुरा उत्तर प्रदेश-281001 (Unit I)
- 2 आचार्य रामचन्द्र शुक्ल लोकभारती प्रकाशन इलाहाबाद. (Unit II)
- 3 प्रकाशक: विनोद पुस्तक मंदिर आगरा-282002 (Unit III)
- 4 पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024 (Unit IV)
- 5 प्रकाशक: दक्षिण भारत प्रचार सभा चेन्नई -17 (Unit V)



Course Code	Course Name	Category	L	T	P	Credit
221TL1A3MA	MALAYALAM - III	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam 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 fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUS ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221TL1A3MA	MALAYALAM - III	SEMESTER III
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Poetry 10 h

Kumaranasan

Unit II Poetry 10 h

Kumaranasan

Unit III Poetry 10 h

Kumaranasan

Unit IV Poetry 10 h

Vayalar Ramavarma

Unit V Poetry 08 h

Vayalar Ramavarma

Text Books

- 1 Kumaranasan. 1998. Chinthavishtayaya Sitha. DC Books Kottayam, Kerala, India. (Unit I to III)
- 2 Ayisha (Poem), National Book Stall Kottayam, Kerala, India. (Unit IV & V)

Reference

- 1 Dr.M.Leelavathy. Kavitha Sahithya Charithram. Sahithya Academy Thrissur, Kerala, India.



Course Code	Course Name	Category	L	T	P	Credit
221TL1A3FA	FRENCH - III	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the 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
- 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	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input checked="" type="checkbox"/>	Innovations
<input checked="" type="checkbox"/>	Intellectual Property Rights	<input checked="" type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input checked="" type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



221TL1A3FA	FRENCH - III	SEMESTER III
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I

10 h

<ul style="list-style-type: none"> ° Décrire un lieu. ° Situer 	A partir d'une recherche de documents, composer une présentation touristique pour un magazine ou un site internet.	Comprendre la description d'un lieu. Décrire une ville ou une région qu'on aime. Interroger sur la situation d'un lieu. Comprendre des indications sur la fréquence d'actions.	Comprendre une présentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation précise dans un message électronique.
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Unit II

10 h

Se situer dans le temps.	A partir d'une recherche de documents, composer une présentation touristique pour un magazine ou un site internet.	Comprendre la description d'un lieu. Décrire une ville ou une région qu'on aime. Interroger sur la situation d'un lieu. Comprendre des indications sur la fréquence d'actions.	Comprendre une présentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation précise dans un message électronique.
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Unit III

10 h

Raconter. <ul style="list-style-type: none"> ° Décrire les étapes d'une action. 	Raconter une scène insolite à l'oral et à l'écrit.	Comprendre le récit d'un voyage. Raconter ses actions quotidiennes.	Ecrire une biographie à partir d'éléments écrits.
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Unit IV

10 h

Exprimer l'intensité et la quantité. <ul style="list-style-type: none"> ° Interroger. 	Raconter une scène insolite à l'oral et à l'écrit.	Comprendre le récit d'un voyage. Raconter ses actions quotidiennes.	Ecrire une biographie à partir d'éléments écrits.
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Unit V

08 h

Make in Own Sentences based on the above Lessons
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Text Book

- 1 LATITUDES 1 (Méthode de français) Pages from 102-127, Author : Regine Mérieux, Yves Loiseau (Unit I to IV)



Course Code	Course Name	Category	L	T	P	Credit
221EL1A3EA	PROFESSIONAL ENGLISH - III	LANGUAGE- II	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the basics of English grammar and specific usage
- the importance of the vocabulary and use in different contexts
- the necessity of communication and composition writing skills

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Infer the specific usage of while-listening process	K2
CO2	Organize the various abilities and sub-skills involved in reading	K3
CO3	Utilize the importance of speaking skills and developing it through various practices	K3
CO4	Assume the sentence construction and paragraph development	K4
CO5	Acquire all-round mature outlook to function effectively in different context	K4

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221EL1A3EA	PROFESSIONAL ENGLISH - III	SEMESTER III
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Listening and Reading 09 h

Listening in casual conversation, Small group and Conference setting - Listening for Factual Information, Detail and Situation - Developing Listening skills- Why do we avoid Listening- Poor Listening - Disadvantages - Poor listening vs Effective Listening - Basics of Reading- efficient and inefficient readers- Advantages - Benefits and Effective reading and comprehension skills- Need for Developing Efficient Reading skills- Four Basic steps of Effective Reading - Stumbling blocks in becoming an effective Reader- Improving Vocabulary power- Strategies for Comprehending and Retaining content- Effective Note Taking while Reading

Unit II Speaking 11 h

Purpose of General Conversations- Advantages, features of a good conversation- Tips for improving conversation- public speaking- importance of public speaking- Benefits, Tips, Overcoming fear of public speaking- Preparatory steps - Structuring the contents- Audience Awareness- Mode of Delivery

Unit III Writing Skills 10 h

CV and Job Applications- How to make your letter stand out?- Employers expectation - Organize the material - Useful suggestions- Cover Letter- Content to be included - Tone of the letter - Report Writing- importance - features- Types - main parts - Feasibility report- Accident report- Scientific report- Memos - Introduction - Structure- Proposal Writing- Key factors- Types- Contents- Format- Evaluation

Unit IV Effective Skills in Language 10 h

Using Word's Effectively- Mastering Spelling Techniques- Structuring Phrases and Clauses- Writing Effective Sentences- Building Effective paragraphs- Revising, Editing and Proof reading

Unit V Soft Skills 08 h

Introduction- What are soft skills?- Importance of soft skills- Attributes- Social soft skills- Thinking- Negotiating- Exhibiting- Identifying- Improving- Will formal training enhance your soft skills? - Soft Skills training -Train Yourself- Practicing soft skills- Measuring attitude - Self-Discovery: Importance of knowing yourself- Process - SWOT analysis - Benefits - Usage - SWOT Analysis grid



Text Books

- 1 Camp and Satterwhite. 1998. College English and Communication. 7th Edition
Glencoe Mchrawtill Publishers, New York, Unites States of America. (Unit I, II, III)
- 2 Kumar, Sanjay and Lata Pushp. 2018. Language and Communication Skills for Engineers. First Edition, Oxford University Press, India. (Unit I, II, III)
- 3 Mohan, Krishna and Banerji, Meera. 2009. Developing Communication skills. 2nd Edition, Macmillcan, India. (Unit I, II, III, IV)
- 4 Alex. Soft Skills. 2009. S. Chand Publishing, New Delhi, India. (Unit V)

References

- 1 Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw- Hill Education, Chennai, India.
- 2 Miles Craven. 2008. Cambridge English Skills Real Listening and Speaking. First Edition, Cambridge University Press, United Kingdom.
- 3 Mishra, Gauri and Ranjana Kaul. 2016. Language Through Literature. Primus Books, India.
- 4 Pillai G, Radhakrishna. 2000. English for Success. Emerald Publishers, Chennai, India.



Course Code	Course Name	Category	L	T	P	Credit
224DA1A3CA	DATABASE SYSTEM CONCEPTS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Fundamental concepts of database analysis and design.
- The basics of SQL and construct queries using SQL.
- The basic issues of transaction processing and concurrency control.

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 databases.	K2
CO2	Apply SQL queries for a given context in relational database.	K3
CO3	Apply the knowledge of relation database design.	K3
CO4	Analyze storage techniques and transaction management.	K4
CO5	Apply distributed database concepts and NoSQL database.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



224DA1A3CA	DATABASE SYSTEM CONCEPTS	SEMESTER III
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Relational Databases 8 h

Introduction to the Relational Model - Structure - Database Scheme - Keys - Schema Diagrams - Relational Query Languages - Relational Operations. Introduction to SQL: Overview of the SQL Query Language- SQL Data Definition - Basic Structure - Additional Operations - Set Operations - Null Values - Aggregate Functions - Nested Subqueries.

Unit II Intermediate and Advanced SQL 10 h

Intermediate SQL: Join Expressions - Views - Transactions - Integrity Constraints - SQL Data Types and Schemas - Authorization. Advanced SQL: Accessing SQL From a Programming Language - Functions and Procedures - Triggers - Recursive Queries - Advanced Aggregation Features - Online Analytical Processing.

Unit III Database Design 10 h

Database Design and the E-R Model: Overview of the Design Process - Entity-Relationship Model - Constraints - Removing Redundant Attributes - Entity-Relationship Diagrams - Reduction to Relational Schemas - Entity-Relationship Design Issues - Extended E-R Features. Relational Database Design: Features - Atomic Domains and First Normal Form - Second and Third Normal Forms- Decomposition using Functional Dependencies -Boyce Codd Normal Form (BCNF).

Unit IV Transaction Management 10 h

Transactions: Transaction Concept - A Simple Transaction Model - Storage Structure - Transaction Atomicity and Durability - Transaction Isolation - Serializability - Transaction Isolation and Atomicity - Transaction Isolation Levels - Implementation - Transactions as SQL Statements. Concurrency Control: Lock-Based Protocols - Deadlock Handling - Timestamp-Based Protocols - Validation-Based Protocols.

Unit V Modern Databases 10 h

Distributed Databases: Homogeneous and Heterogeneous Databases - Distributed Data Storage - Distributed Transactions - Distributed Query Processing. NoSQL



Databases: Introduction - Column Oriented Stores - Key/Value Stores - Document Databases - Graph Databases - CRUD Operations.

Text Books

- 1 A.Silberchartz, H.F.Korth,S.Sudarshan (2019), "Database System concepts", (7th Edn.), Mc Graw Hill. Unit 1 - V
- 2 Shashank Tiwari (2011), "Professional NoSQL", John Wiley & Sons, Inc. Unit V

References

- 1 Nilesh Shah, 2005, "Database Systems Using Oracle : A Simplified Guide to SQL and PL/SQL", Second Edition, Pearson Education
- 2 Raghuram Krishnan, JohnnesGehrke,(2011), "Database Management System", (3rd Edn.), Mc Graw Hill
- 3 O`neilPatricand, O`neil Elizabeth,(2008), "Database Principles, Programming and Performance", (2nd Edn.), Margon Kaufmann Publishers Inc
- 4 ElmasriRamez and NavatheShamkant.B, (2010), "Fundamentals of Database System Concepts", (6th Edn.), Addison Wesley



Course Code	Course Name	Category	L	T	P	Credit
224CS1A3CA	OPERATING SYSTEMS	CORE	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The operations performed by OS as a resource manager.
- The various logical aspects of scheduling various processes.
- The mechanisms in 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	Understand the role of operating system with its function and services.	K2
CO2	Compute the waiting time and turnaround time using different process scheduling algorithms.	K3
CO3	Illustrate the methods for handling and preventing deadlocks.	K3
CO4	Apply the various mechanisms involved in memory management in contemporary OS.	K3
CO5	Allocate and deallocate memory space in secondary storages using scheduling methods.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



224CS1A3CA	OPERATING SYSTEMS	SEMESTER III
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Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Introduction to Operating Systems 6 h

Computer System Organization - Computer System Architecture - Operating System Structure - Distributed Systems - Open Source Operating Systems - Operating System Generation.

Unit II Process Scheduling 8 h

Process Concepts - Operations on Processes. Basic Concepts - Scheduling Criteria - Scheduling Algorithms: First-Come First-Served Scheduling - Shortest-Job-First Scheduling - Priority Scheduling - Round-Robin Scheduling - Multilevel Queue Scheduling. Synchronization: Background - The Critical - Section Problem - Semaphores.

Unit III Deadlocks 8 h

Deadlocks: Deadlock Characterization - Methods for Handling Deadlock - Deadlock Prevention - Deadlock Avoidance: Safe State - Resource-Allocation Graph Algorithm - Banker's Algorithm - Deadlock Detection - Recovery from Deadlock.

Unit IV Memory Management 8 h

Memory Management: Swapping - Contiguous Memory Allocation - Paging - Structure of Page Table - Segmentation. Virtual Memory: Demand Paging - Page Replacement: Basic Page Replacement - FIFO Page Replacement - Optimal Page Replacement - LRU Page Replacement.

Unit V Storage Management 6 h

Secondary-Storage Structure : Disk Structure - Disk Scheduling: FCFS Scheduling - SSTF Scheduling SCAN Scheduling-C-SCAN Scheduling-LOOK Scheduling- Selection of a Disk Scheduling Algorithm - RAID structure.

Case Studies: Linux System, Mobile Operating System.



Text Books

- 1 Silberschatz, Galvin, Gagne, 2018, "Operating System Concepts", 9th Edition, Wiley.

References

- 1 Andrew S. Tanenbaum, 2018, "Modern Operating Systems 4e", Pearson Education India.
- 2 Mukesh Singhal, Niranjana G. Shivaratri, 2019, "Advanced Concepts in Operating System", 10th edition, McGrawHill.
- 3 William Stallings, 2017, "Operating Systems: Internals and Design Principles", 9th Edition, Pearson Education.
- 4 Herbert Bos, S.Tanenbaum, 2020, "Modern Operating System", 6th Edition Pearson education.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A3CP	PROGRAMMING IN JAVA	CORE PRACTICAL	3	-	4	4

PREAMBLE

This course has been designed for students to learn and understand

- The object-oriented programming concepts, and apply them in solving problems.
- The implementation of packages and interfaces.
- To design of Graphical User Interface and Collections using Java.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Java Language fundamentals.	K2
CO2	Develop reusable programs using the concepts of inheritance, polymorphism and interfaces.	K3
CO3	Apply the exception handling to develop efficient and error free codes.	K3
CO4	Apply the concepts of multithreading and design event driven GUI and web related applications.	K3
CO5	Demonstrate the implementation of JDBC and Collection classes.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



224AI1A3CP	PROGRAMMING IN JAVA	SEMESTER III
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Total Credits: 5

Total Instruction Hours: 84 h

Syllabus

Unit I Java Fundamentals 17 h

Introduction - Data Types - Variables - Operators - Strings - Input and Output - Control flow - Arrays - Objects and Classes - Static Fields and Methods - Method Parameters - Object Construction.

- Simple Java programs to demonstrate the use of language fundamentals.
- Programs to demonstrate the Classes, Objects, and Constructors in Java.
- Programs to implement the Method and Constructor overloading.
- Programs to demonstrate the use of Scanner class.

Unit II Inheritance and Interfaces 17 h

Classes, Super Classes and Sub Classes - Polymorphism - Casting - Abstract Classes - Interfaces: Properties - Interface Concepts - Lambda Expressions - Inner Classes.

- Demonstrate Single, Multilevel and Hierarchical Inheritance in Java.
- Programs to implement Abstract classes with example.
- Program to implement Interface using extends keyword.
- Develop programs using static and private inner classes.

Unit III Exception Handling and Packages 17 h

Dealing with Errors - Catching Exceptions - Tips for using Exceptions - Packages: Package Names - Class Importation - Static Imports - Adding classes into Packages - Package Access.

- Study and Implementation of Checked Exceptions.
- Study and Implementation of Unchecked Exceptions.
- Programs to demonstrate Packages in Java.

Unit IV Threads and GUI Programming 17 h

Introduction to Threads - Thread States - Properties - Synchronization - GUI: Java User Interface Toolkits - Displaying Frames - Displaying Information - Event Handling - API.

- Program to implement thread using runnable interface.
- Program to creating multiple threads and setting priorities.
- Demonstrate the producer-consumer problem.



- d) Create a simple GUI application in Java.

Unit V JDBC and Collections

16 h

JDBC: Architecture - JDBC - ODBC - Types of Drivers - Components - Interfaces and classes - Steps for querying the database with JDBC. Collections: Java Collections Framework - Interfaces in Collections - Concrete Collections.

- a) Programs to implement JDBC connectivity.
- b) Programs to demonstrate the interfaces in collections.
- c) Programs to implement the concrete collection classes.

Text Books

- 1 Cay S Horstmann ,(2020),"Core Java Volume-1 Fundamentals", (11th Edn.), Pearson Indian Education Services Pvt. Lt, India.
- 2 Herbett Schildt, (2014), "Java: The Complete Reference", Ninth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

References

- 1 C. Xavier,(2010), "Programming with JAVA 2", SciTech Publication, Chennai.
- 2 Paul Deitel and Harvey Deitel, (2015), "Java How to Program", Tenth Edition,Deitel & Associates, Inc Publications.
- 3 Instructional Software Research and Development (ISRD) Group,(2007), "Introduction to Object Oriented Programming through Java", Tata McGraw-Hill Publishing Company Limited, New Delhi.



224AI1A3SP	SEC PRACTICAL-I : SQL - PL/SQL	SEMESTER- III
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Total Credits: 2

Total Instructions Hours: 48h

S.No

List of Experiments

- 1 Draw the ER - Diagram for the following scenarios like Banking System, Hospital Management, Library Management and etc...
- 2 Demonstration of DDL commands of SQL with suitable examples.
- 3 Implementation of DML commands of SQL with suitable examples.
- 4 Implementation of different types of function (Number Function ,Aggregate Function, Character Function, Conversion Function , Date Function) with suitable examples.
- 5 Implementation of different types of operators in SQL.
- 6 Study and Implementation of Sub-queries and Views.
- 7 Study and Implementation of different types of constraints.
- 8 Study and Implementation of Group By, having clause, Order by clause and Indexing.
- 9 Implement a PL/SQL block to check number is odd or even.
- 10 Implement a PL/SQL block to reverse the string.
- 11 Implement a PL/SQL block to swap two numbers.
- 12 Study and Implementation of Rollback, Commit, Savepoint.

Note: Out of 12 - 10 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
222MT1A3ID	DISCRETE MATHEMATICS	IDC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The logical operators and applications
- The concept of relation and functions.
- The application of graph theory, trees and automata.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the concept of set theory	K1
CO2	Interprets the various optimization problems in the term of relations and functions	K2
CO3	Identify applications of logical operators	K2
CO4	Model and solve real world problems using graphs and theory	K4
CO5	Relate the concept of Finite state automation in practical problems.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



222MT1A3ID	DISCRETE MATHEMATICS	SEMESTER III
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Set Theory 9 h

Set and its elements - set description - types - Venn-Euler Diagrams - set operations and laws of set theory - fundamental products - index and indexed sets - partitions of sets - minsets - countable and uncountable sets - Algebra of sets and duality - computer representation - the inclusion and exclusion principle

Unit II Relations and Functions 10 h

Relations: Introduction - cartesian product of sets - binary relations - set operation on relations - types- partial order relation - equivalence relation and classes- Functions: Introduction - types - invertible functions - composition of functions.

Unit III Mathematical Logic 10 h

Propositional calculus - basic logical operations - statements generated by a set - conditional statements - converse, inverse and contrapositive statements - biconditional - tautologies - contradiction - contingency - argument - methods of proof - equivalence and implication

Unit IV Graph Theory and Trees 10 h

Basic terminologies - paths, cycles and connectivity - subgraphs - types - isomorphic and homeomorphic graphs - representation of graphs in computer memory- Eulerian and Hamiltonian graphs- cartesian product- shortest path.

Trees: Properties - binary trees - complete binary tree - tree of an Algebraic expression - traversing binary trees.

Unit V Language, Grammar and Automata 9 h

Language: the set theory of strings - languages - regular expressions and regular languages - grammar - finite state machine - finite state automata.

Note: 20% Theory and 80% Problem



Text Books

- 1 Sharma J.K., 2022, "Discrete Mathematics", 4th Edition, Trinity Press, New Delhi.

References

- 1 Tremblay J.P. and ManoharR., 1997, "Discrete Mathematics Structures with Applications to computer science", 2nd Edition, Mc Graw Hill International, New York.
- 2 VenkataramanM.K, SridharanN. and ChandrasekaranN., 2000, "Discrete Mathematics", The National publishing Company, Chennai.
- 3 KolmanB, BusbyR.C.andRossS.C., 2006, "Discrete Mathematical Structures", 5th Edition., Prentice Hall of India Pvt. Ltd., New Delhi.
- 4 KennethH.Rosen., 1999, "Discrete Mathematics and its Applications", 4th Edition, McGraw-Hill Professional-China.



224AI1ASSA	SELF STUDY: BUSINESS INTELLIGENCE	SEMESTER III
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Total Credit: 1

Syllabus

Unit I Introduction to Business Intelligence

History of Business Intelligence - The Data Warehouse-Offline Extract, Transform and Load (ETL) - Data-Mining Engines - Reporting Tools - Data Marts - Purpose of Business Intelligence Systems .

Unit II Multidimensional Analysis

Structure of Intelligence Systems -Business Intelligence Applications - Decision Support Tools-Access Enablers - Data Management -Data Warehouse Modelling - Dimension Attributes - Key Attribute - Dimension Hierarchy - Type of Hierarchy.

Unit III Dimensional Data Warehouse

Introduction - Dimensional Model -Facts Table -Types of Measure - Types of Fact Table - Dimension Tables - Surrogate Keys and Alternative Table Structure - Advantages of Surrogate Keys -Disadvantages of Surrogate Keys -Alternative Tables used in Data Warehousing.

Unit IV Understanding OLAP

Multidimensional OLAP - MOLAP - ROLAP - HOLAP- Basic Concepts of OLAP - Components of OLAP - Advantages of OLAP -Metadata - Types of Metadata - Metadata Functions -Advantage of Metadata .

Unit V Microsoft Business Intelligence Platform

Business Intelligence Platform Requirements - Uses of Microsoft BI Services - Microsoft's Business Intelligence Platform Strategy - Partnerships - Microsoft's Business Intelligence Platform -Packaging and Price - Oracle's Business Intelligence Platform Strategy



Text Books

- 1 Sartaj Singh (2015), "Business Intelligence", (1st Edn.), Excel Books Pvt.Ltd.,New Delhi.
- 2 Efraim Turban, Ramesh Sharda, Dursun Delen,(2013), "Decision Support and Business Intelligence Systems", (9th Edn.), Pearson.

References

- 1 Carlo Vercellis,(2009), "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications.
- 2 David Loshin Morgan, Kaufman,(2012), "Business Intelligence: The Savvy Manager's Guide", (2nd Edn.).



224AI1ASSB	SELF STUDY: BIG DATA TECHNOLOGIES	SEMESTER III
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Total Credit: 1

Syllabus

Unit I Fundamentals of Big Data

Evolution of data management - Understanding the waves of managing the data - Defining Big data - Big data management architecture - Big data journey.

Unit II Examining Big Data Types

Defining Structured data - Sources of Big structured data - Role of relational databases - Defining Unstructured data - Sources of Big structured data - Role of CMS - Distributed Computing.

Unit III Technology foundations for Big Data

Exploring Big data stack - Big data analytics - Big data applications - Basics of virtualization - Importance of virtualization in Big data - Implementing the virtualization.

Unit IV Examining Cloud and Big Data

Defining Cloud - Cloud deployment models - Cloud delivery models - Cloud usage for Big data - Big data cloud service providers - Amazon public elastic compute cloud - Google big data services - Microsoft Azure - Open Stack.

Unit V MapReduce Fundamentals

Origins of MapReduce - Map function - Adding the reduce function - Putting map and reduce together - Optimizing the MapReduce tasks - Hardware/network topology - Synchronization - File System.





Text Books

- 1 Judith Hurwitz, Alan Nugent, Dr. Fern Halper, and Marcia Kaufman (2013), "Big Data for Dummies", (1st Edn.), John Wiley & Sons, Inc.
- 2 Rajkumar Buyya, (2015), "Big Data Principles and Paradigms", (2nd Edn.), Morgan Kaufmann imprint of Elsevier

References

- 1 Jay Liebowitz, (2013), "Big Data and Business Analytics" Auerbach Publications, CRC press.
- 2 Arvind Sathi, (2012), "Big Data Analytics: Disruptive Technologies for Changing the Game", MC Press.


 BoS Chairman / HoD
 Department of Artificial Intelligence and Machine Learning
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 Dr.N.G.P. Arts and Science Col'		
APPROVED		
BOS - 3rd	AC - 15th	GB - 20th
09.06.23	14.07.23	05.08.23



Course Code	Course Name	Category	L	T	P	Credit
221TL1A4TA	TAMIL - IV	LANGUAGE-I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு நாகரீகம், 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	வாழ்க்கைத் திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத் திறனை ஊக்குவித்தல்	K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input checked="" type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input checked="" type="checkbox"/> Innovations
<input checked="" type="checkbox"/> Intellectual Property Rights	<input checked="" type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input checked="" type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



Dr.NGPASC

COIMBATORE | INDIA

B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

221TL1A4TA	TAMIL - IV	SEMESTER IV
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I எட்டுத்தொகை 10 h

1. நற்றிணை – குறிஞ்சித் திணை

I.பா.எண் : 01 – கபிலர்

II.பா.எண் : 88 – நல்லந்துவனார்

III.பா.எண் : 102 – செம்பியனார்

2. குறுந்தொகை – முல்லைத்திணை

I.பா.எண் : 65 – கோலூர்கிழார்

II. பா.எண் : 167 – கூடலூர்கிழார்

மருதத்திணை

I.பா.எண் : 08 – ஆலங்குடி வங்கனார்

II.பா.எண் : 61 – தும்பிசேர்கீரனார்

III.பா.எண் : 196 – மிளைக் கந்தன்

நெய்தல் திணை

I.பா.எண் : 57 – சிறைக்குடி ஆந்தையார்

Unit II எட்டுத்தொகை 08 h

1. கலித்தொகை – பாலைக்கலி

I.பா.எண் : 09 – பெருங்கடுங்கோ

2. அகநானூறு – மருதத்திணை

I.பா.எண் : 86 – நல்லாவூர்கிழார்

3. புறநானூறு -

I.பா.எண் : 188 – பாண்டியன் அறிவுடை நம்பி

II.பா.எண் : 192 – கணியன் பூங்குன்றனார்

III.பா.எண் : 279 – ஒக்கூர் மாசாத்தியார்

IV.பா.எண் : 312 – பொன்முடியார்

Unit III பத்துப்பாட்டு 10 h

1. பட்டினப் பாலை – கடியலூர் உருத்திரங் கண்ணனார் -1முதல் 218 வரிகள் வரை மட்டும்.

Unit IV இலக்கிய வரலாறு 10 h



1. எட்டுத் தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்

Unit V இலக்கணம் மற்றும் திறனாய்வுப் பகுதி

10 h

I.இலக்கணம்

1. அகத்திணை – அன்பின் ஐந்திணை - விளக்கம்
2. புறத்திணை – 12 திணைகள் - விளக்கம்

II.பயிற்சிப் பகுதி

சங்கப் பாடல்கள் குறித்து திறனாய்வு செய்தல்

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

Text Book

செய்யுள் திரட்டு - மொழிப் பாடம் - 2022- 23

- 1 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, வெளியீடு : நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 600 098. (Unit I- V)

References

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



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COIMBATORE | INDIA

B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
221TL1A4HA	HINDI - IV	LANGUAGE-I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- 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	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input checked="" type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input checked="" type="checkbox"/> Innovations
<input checked="" type="checkbox"/> Intellectual Property Rights	<input checked="" type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input checked="" type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



221TL1A4HA	HINDI- IV	SEMESTER IV
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I	10 h
नाटक	
Unit II	10 h
एकांकी	
Unit III	10 h
काव्य मंजरी	
Unit IV	10 h
सूचना लेखन	
Unit V	08 h
अनुवाद अभ्यास- III	

Text Books

- 1 लडाई – सर्वेश्वरदयाल सक्सेना प्रकाशक: वाणी प्रकाशन 21-A, दरियागंज नई दिल्ली-110002. (Unit I)
- 2 एकांकी पंचामृत – डॉ राम कुमार (भोर और तारा छोडकर) प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुरा उत्तर प्रदेश-281001. (Unit II)
- 3 काव्य मंजरी- (डा मुन्ना तिवारी) मैथिलीशरण गुप्त- मनुष्यता, जयशंकर प्रसाद- बीती विभावरी जागरी सूर्यकान्त त्रिपाठी निराला- तोडती पत्थर और भिक्षुक. (Unit III)
- 4 सूचना लेखन पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद -211024. (Unit IV)
- 5 अनुवाद अभ्यास (केवल अंग्रेजी से हिन्दी में) (पाठ 10 to 20) प्रकाशक: दक्षिण भारत प्रचार सभा चेन्नई -17 (पाठ10 to 20). (Unit V)



Dr.NGPASC

COIMBATORE | INDIA

B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
221TL1A4MA	MALAYALAM- IV	LANGUAGE - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam 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 fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUS ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221TL1A4MA	MALAYALAM- IV	SEMESTER IV
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I	Drama	10 h
	Saketham- Sreekandan Nair	
Unit II	Drama	10 h
	Saketham- Sreekandan Nair	
Unit III	Drama	10 h
	Saketham- Sreekandan Nair	
Unit IV	Screen Play	10 h
	Perumthachan- Vasudevan Nair	
Unit V	Screen Play	08 h
	Perumthachan- Vasudevan Nair	

Text Books

- 1 Nair, Sreekandan C.N. 2023. Saketham, Drama. DC Books Kottayam, Kerala, India. (Unit I to III)
- 2 Nair, Vasudevan M.T. 1994. Perumthachan- Screenplay. DC Books Kottayam, Kerala, India. (Unit IV & V)

Reference

- 1 Sankarapillai. 2005. Malayala Nataka Sahithya Charithram, Kerala Sahithya Akademi Publishers, Kerala, India.



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COIMBATORE | INDIA

Course Code	Course Name	Category	L	T	P	Credit
221TL1A4FA	FRENCH - IV	LANGUAGE- I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the 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
- 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	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input checked="" type="checkbox"/>	Innovations
<input checked="" type="checkbox"/>	Intellectual Property Rights	<input checked="" type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input checked="" type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



221TL1A4FA	FRENCH - IV	SEMESTER IV
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I

10 h

° Décrire quelqu'un. ° Comparer	En milieu professionnel, recruter quelqu'un et justifier son choix.	S'exprimer sur les styles de vêtements. Reconnaître des personnes à partir de descriptions.	Comprendre la description de personnes dans un extrait de roman.
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Unit II

10 h

Exprimer l'accord ou le désaccord. ° Se situer dans le temps.	En milieu professionnel, recruter quelqu'un et justifier son choix.	Décrire des personnes. Comprendre des personnes qui expérimentent leur accord ou leur désaccord.	Comprendre des différences de points de vue exprimés dans de messages électroniques. Raconter un souvenir.
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Unit III

10 h

° Parler de l'avenir.	Discuter de l'organisation d'un voyage de groupe puis préparer une fiche projet et la présenter.	Comprendre une chanson. Échanger sur ses projets de vacances.	Comprendre le message d'une carte d'anniversaire.
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Unit IV

10 h

° Exprimer des souhaits. ° Décrire quelqu'un	Discuter de l'organisation d'un voyage de groupe puis préparer une fiche projet et la présenter.	Discuter du programme de la soirée à venir. Addresser des souhaits à quelqu'un.	Comprendre le message d'une carte d'anniversaire.
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Unit V

08 h

Make in Own Sentences based on the above Lessons

Text Book

- 1 LATITUDES 1 (Méthode de français) Pages from 128-151, Author : Regine Mérieux, Yves Loiseau (Unit I to IV)



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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

Course Code	Course Name	Category	L	T	P	Credit
221EL1A4EA	PROFESSIONAL ENGLISH - IV	LANGUAGE- II	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the skill-based learning for better communication
- the prevalent issues logically and present coherently
- the ideas accurately and clearly

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Develop the ability to appreciate ideas and think critically	K1
CO2	Integrate academic success into practical life skills	K2
CO3	Express challenges of a competitive environment and select the profession that best suits them	K2
CO4	Discuss with confidence in conversations, to initiate, sustain and close a conversation	K3
CO5	Identify a sense of social commitment	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓ Skill Development	✓ Entrepreneurial Development
✓ Employability	✓ Innovations
✓ Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	✓ Constitutional Rights/ Human Values/ Ethics



221EL1A4EA	PROFESSIONAL ENGLISH - IV	SEMESTER IV
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Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Career 08 h

Leadership- Everyday leadership- Everyday leaders motivation- Qualities of a good leader- Professionalism- Creativity- Practical Application- Ways to become more creative- Six Thinking hats techniques

Unit II Art of Promoting 11 h

Selling your skills- Neuromarketing as a tool for influencing leaders- Using neuromarketing and psychology to get ahead- Recruiters and Clients decision making skills- Three steps to use neuromarketing for a successful life- Attention-storytelling- Perception and reputation- Recognize opportunities and openings before the competition- observation- Matching yourself with your leaders

Unit III Facing Challenges 10 h

Introduction-Panicky people- Negative people- Positive people- Facing challenges and taking initiatives – Importance of youth to face challenges and take initiative Benefits of Facing challenges- Facing challenges in life

Unit IV Effective Decision Making 10 h

Decision Making Process- Methods of Decision Making- Steps in DM- Theoretical Approaches to individual Decision Making- Optimizing Decision Theory- The Subjective Expected Utility Model- Steps to Effective Decision- Making- Effective Decision Making in Terms- Methods for team decision making- Confusion and decision making- Decision making styles

Unit V Practising Corporate Social Responsibility (CSR) 09 h

Corporate Social Responsibility (CSR)- definitions- Goal- Areas- Need- Benefits - Argument in favour/against of CSR- Factors that promote CSR – Limitations for implementing- India and Corporate Social Responsibility- Activities carried out by Companies in India- List of projects for funding under CSR- Implementation of CSR commitments



Text Books

- 1 Sharma, Prashant. 2022. Soft Skills. BPB Publications, 3rd Edition, New Delhi, India. (Unit I & II)
- 2 Alex. 2013. Managerial Skills. S. Chand Publishing, New Delhi, India. (Unit III to V)
- 3 Alex. 2009. Soft Skills. S. Chand Publishing, New Delhi, India. (Unit II)
- 4 E H McGrath S J. 2011. Basic Managerial Skills for All, 9th Edition, New Delhi, India. (Unit III)

References

- 1 Adair J. 1986. Effective Team Building: How to make a winning team. Pan Books, London, United Kingdom.
- 2 Dhanavel S P. 2010. English and Soft Skills, Orient Blackswan, Hyderabad, India.
- 3 Singh S R. 2011. Soft Skills. APh Publishing Corporation, New Delhi, India.
- 4 Lakshminarayanan K R, Murugavel T. 2015. Managing Soft Skills. Scitch Publications, Chennai, India.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A4CA	CORE-VII :FOUNDATIONS OF ARTIFICIAL INTELLIGENCE	CORE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- The foundations of Artificial Intelligence.
- The basic areas of artificial intelligence including problem solving, knowledge representation and reasoning.
- To demonstrate working knowledge of reasoning in the presence of uncertain information.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate fundamental understanding of the history of AI and its foundations.	K2
CO2	Understand and implement the informed and uninformed search techniques in AI.	K3
CO3	Explain the formal methods of knowledge representation.	K2
CO4	Apply logic and reasoning techniques to AI applications.	K3
CO5	Recognize the importance of various AI applications and expert systems.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input type="checkbox"/> Innovations
<input type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input type="checkbox"/> Social Awareness/ Environment	<input type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



224AI1A4CA	CORE-VII : FOUNDATIONS OF ARTIFICIAL INTELLIGENCE	SEMESTER IV
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Foundations of AI 08 h

Introduction - Definitions - History of AI - AI Problems and Techniques - Problem Solving Methods: Introduction - State Space Search - Production Systems - Problem Characteristics - Control Strategies - Issues in the design of search programs - Search Strategies.

Unit II Informed and Uninformed Search 10 h

Introduction - Generate and Test Method - Hill Climbing Method - Best First Search and A* Search - Means End Analysis - Intelligent Agents and Environments - Problem Reduction - AO* Algorithm - Constraint Satisfaction with Inference - Local Search Algorithms.

Unit III Knowledge Representation 10 h

Introduction - Ontologies, Objects and Events - Representations and Mappings - Approaches to Knowledge Representation - Forward Vs Backward Chaining - Matching and Control Knowledge - Slot and Filler Structures - Issues in Knowledge Representation - Developments in Knowledge Representation.

Unit IV Logic in AI 10 h

Overview - Propositional Logic - First Order Logic - Prolog: Logic Programming - Symbolic Logic - Conversion: English to Prolog - Terminologies - Variables and Operators - Inference Process - Tracing Model of Execution - List Structures - Operations - Drawbacks of Prolog - Applications of Prolog.

Unit V Applications of AI and Expert Systems 10 h

Game Playing : Minimax Search Procedure - Alpha - Beta Cutoff - Text Analysis and Mining : Language Models - Text Classification - Information Retrieval - Information Extraction - Expert systems: Introduction - Knowledge Representation - Expert System Shells - Knowledge Acquisition - Applications of Expert Systems.



Text Books

- 1 Lavika Goel, (2021), "Artificial Intelligence – Concepts and Applications ", (1st Edn.), Wiley India Pvt. Ltd.
- 2 Stuart Russell and Peter Norvig, (2011), "Artificial Intelligence - A Modern Approach", (3rd Edn.), Prentice Hall.

References

- 1 Elaine Rich, Kevin Knight and Shiv Shankar B. Nair, (2009)," Artificial Intelligence (SIE)", (3rd Edn.), Tata McGraw Hill.
- 2 Wolfgang Ertel, (2017)," Introduction to Artificial Intelligence", (2nd Edn.), Springer.
- 3 Stephen Lucci and Danny Kopec, (2015)," Artificial Intelligence in the 21st Century", (2nd Edn.), Mercury Learning and Information.
- 4 Peter Jackson,(2007), "Introduction to Expert Systems", (3rd Edn), Pearson Education



Course Code	Course Name	Category	L	T	P	Credit
224AI1A4CB	CORE-VIII :DESIGN AND ANALYSIS OF ALGORITHMS	CORE	3	0	0	3

PREAMBLE

This course has been designed for students to learn and understand

- To apply the various algorithm analysis techniques.
- The different algorithm design techniques.
- The classes of problems and limitations of algorithmic power.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the various algorithm design techniques.	K2
CO2	Express the brute force approach and divide and conquer methods against real-time problems.	K3
CO3	Demonstrate the dynamic programming and greedy methods against real-time problems.	K3
CO4	Apply the backtracking and branch and bound methods against real-time problems.	K3
CO5	Analyze and classify classes of problems and limitations of algorithmic power.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A4CB	CORE-VIII:DESIGN AND ANALYSIS OF ALGORITHMS	SEMESTER IV
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Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Introduction to Algorithms 8 h

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties.

Unit II Brute Force and Divide and Conquer Techniques 7 h

Brute Force –Exhaustive Search – Traveling Salesman Problem – Knapsack Problem – Assignment problem. Divide and conquer methodology – Merge sort – Binary Tree Traversal –Strassen’s Matrix Multiplication.

Unit III Dynamic Programming and Greedy Techniques 7 h

Dynamic Programming: Three basic examples- The Knapsack problem and Memory functions – Warshall’s and Floyd’s algorithm – Optimal Binary Search Trees. Greedy Technique: Prim’s algorithm- Kruskal’s Algorithm- Dijkstra’s Algorithm.

Unit IV Backtracking and Branch and Bound Methods 7 h

Backtracking: n-Queens problem -Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound: Assignment problem – Knapsack Problem – Traveling Salesman Problem.

Unit V NP-Hard and NP-Complete Problems 7 h

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



Text Books

- 1 Anany Levitin,(2012), "Introduction to the Design and Analysis of Algorithms", (3rdEdn.), Pearson Education.

References

- 1 T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein,(2011), "Introduction to Algorithms", PHI Pvt. Ltd.
- 2 Sara Baase and Allen Van Gelder,(2003), "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia.
- 3 A.V.Aho, J.E. Hopcroft and J.D.Ullman,(2003), "The Design and Analysis Of Computer Algorithms", Pearson Education Asia.



Course Code	Course Name	Category	L	T	P	Credit
224DA1A4EP	PYTHON FOR DATA SCIENCE	EMBEDDED PRACTICAL	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- Concepts and process of data analysis
- Basic packages to perform scientific computing with Python
- Data visualization techniques for effective analysis

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Python tools to perform Data Analysis	K2
CO2	Apply NumPy library to understand complex data structures	K3
CO3	Apply Pandas library to analyze, clean and explore datasets	K4
CO4	Analyze advanced features of pandas library to perform data manipulation	K2
CO5	Implement matplotlib library to visualize the data in different forms	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

224DA1A4EP	PYTHON FOR DATA SCIENCE	SEMESTER IV
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Total Credits: 5

Total Instruction Hours: 84 h

Syllabus

Unit I Introduction to Data Analysis and Python 17 h

Introduction to Data Analysis: Data Analysis - Knowledge Domains of the Data Analyst - Understanding the Nature of the Data - The Data Analysis Process - Quantitative and Qualitative Data Analysis - Open Data - Introduction to the Python World: Python - The Programming Language - Data Structures - Functional programming

Practical

1. Programs using functions.
2. Programs using tuples.
3. Programs using sets.

Unit II NumPy Library 17 h

NumPy: N-dimensional array - Basic Operations - Indexing, Slicing and Iterating - Conditions and Boolean Arrays - Shape and Array Manipulation - Copies of Objects - Vectorization - Broadcasting - Structured Arrays- Reading and Writing Array Data on Files.

Practical

4. Programs using aggregate functions.
5. Programs for array manipulation.
6. Programs for reading and writing in files.

Unit III Pandas Library 17 h

Pandas Data Structures: Series - DataFrame - Index Object - Functionalities on Indexes - Operations Between Data Structures - Function Application and Mapping - Sorting and Ranking - Correlation and Covariance - Not a Number Data - Hierarchical Indexing and Leveling

Practical

7. Programs using DataFrame



8. Programs to deal with missing values

9. Programs to find Correlation and Covariance

Unit IV Data Manipulation using Pandas 17 h

Data Preparation - Concatenating - Data Transformation - Removing Duplicates - Mapping - Discretization and Binning - Permutation - String Manipulation - Built-in Methods - Regular Expressions - Data Aggregation - Group Iteration - Advanced Data Aggregation

Practical

10. Programs to implement data transformation

11. Programs to implement string manipulation

12. Programs to implement data aggregation

Unit V Data Visualization with matplotlib 16 h

Matplotlib Architecture - pyplot - The plotting Window - Using the keyword args - Adding Elements to the Chart - Line Charts - Histograms - Bar Charts - Pie Charts - Advanced Charts

Practical

13. Programs to visualize data using Bar Charts, Pie charts

14. Programs to visualize data using Advanced Charts

15. Project using Advanced libraries

Text Books

- 1 Fabio Nelli, (2018), "Python Data Analytics with Pandas, NumPy and Matplotlib", (2nd Edn.), Apress.

References

- 1 Wes Mckinney, (2017), "Python for Data: Data Wrangling with Pandas, NumPy, and IPython", (2nd Edn.), O'Reilly
- 2 Jake VanderPlas, (2016), "Python Data Science Handbook", (1st Edn.), O'Reilly
- 3 RehanGuha, (2021) " Machine Learning Cookbook with Python ", (1st Edn.), BPB Publications.
- 4 Dipanjan Sarkar, Raghav Bali, Tushar Sharma, (2018), "Practical Machine Learning with Python", (1st Edn.), Apress



224AI1A4SP	SEC PRACTICAL-II :ARTIFICIAL INTELLIGENCE	SEMESTER- IV
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Total Credits: 2

Total Instructions Hours: 48h

S.No	List of Experiments
1	Implementation of BFS.
2	Implementation of DFS.
3	Program to implement Uniform cost search algorithm.
4	Program to implement A* Algorithm.
5	Write simple fact for the statements using PROLOG.
6	Write predicates one converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.
7	Implement factorial, fibonacci of a given number.
8	Program to solve 4-Queen problem.
9	Program for Travelling Salesperson Problem.
10	Develop a small KB using Prolog and answer simple queries.
11	Program to solve the Monkey Banana problem.
12	Program to implement Hill climbing Algorithm.

Note: Out of 12 - 10 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
225BI1A4IA	DIGITAL BANKING	IDC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The functional knowledge in opting banking
- The evolution of digital banking technology and its dimensions
- The technology adopted in digital banking

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 digital banking	K2
CO2	Identify the different e-Payments methods in banking	K2
CO3	Recognize the various technology platforms in digital banking	K2
CO4	Gain the knowledge of features and technology of mobile banking.	K2
CO5	Understand the role of Fintech and Crypto Currency in banking.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input checked="" type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)

225BI1A4IA	DIGITAL BANKING	SEMESTER IV
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 9 h

Digital Banking - Need for Digital Channel - Customer Preference for Digital Banking - Evolving Customer expectations with digitalization - Significance of Digital Banking - Information Security - Ombudsmen Scheme for Digital Transactions 2021

Unit II Digital Payment Modes 9 h

Cards - Various types of Cards - Features of different types of Cards - Benefits of Cards to Customers - USSD (based on mobile banking) - Mobile wallets - Aadhaar Enabled Payment System (AePS) - UPI - PoS - QR Code

Unit III Technology platform 10 h

RBI Net - Bank Net - Indian Financial Network (INFINET) - Meaning - Features and Membership - Structured Financial Messaging Solution (SFMS) - Society for Worldwide Interbank Financial Telecommunications (SWIFT) - Differences between SFMS and SWIFT - Real Time Gross Settlement (RTGS) - National Electronic Funds Transfer (NEFT).

Unit IV Mobile Banking 10 h

Mobile Banking - Features of Mobile Banking - Immediate Payment Service (IMPS) - Profitability of Mobile Banking - Tele Banking - Net Banking - Risk Management and Fraud mitigation - Back end operations and Technology - Information Security Tips.

Unit V Developments in Digital Technology 10 h

Fintech - Definition - Evolution and Growth - Significance of Fintech - Block Chain - Meaning - How does a Block Chain work - Pros and Cons of Block Chain - Cryptocurrency - Meaning - working of Cryptocurrency - Advantages and Disadvantages

Note:



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B.Sc. Artificial Intelligence and Machine Learning (Students admitted during the AY 2022-23)


Text Books

- 1 Indian Institute of Banking & Finance, 2019 Digital Banking, Taxmann Publications Pvt. Ltd. New Delhi.
- 2 Gordon E and Natarajan 2019 Banking Theory Law and Practices (Twenty Seventh Edition) Himalaya Publishing house, New Delhi.

References

- 1 Sundharam K.P.M & Varshney P.N 2015 Banking Theory, Law and Practice (Reprint 2015) Sultanchand & sons, New Delhi
- 2 Shekar K. C 2015, Banking Theory and Practice (Twenty First Edition) Vikas Publication, Noida.
- 3 Maheswari S. N 2014 Banking Law and Practice (Thirteenth Edition) Kalyani publishers, New Delhi..
- 4 John Henderson, 2019, Retail and Digital Banking Principles and Practice, KoganPage Publisher, United Kingdom.


 18/10/23
 BoS Chairman / HoD
 Department of Artificial Intelligence and Machine Learning
 Dr. N.G.P. Arts and Science College
 Coimbatore - 641 048.

 Dr. N.G.P. Arts and Science College		
APPROVED		
BoS - 4 th 18/10/23	AC - 16 th 13/12/23	GB - 21 st 05/01/24



Course Code	Course Name	Category	L	T	P	Credit
224DA1A5CA	CORE-IX: COMPUTER NETWORKS AND COMMUNICATION	CORE	4	1	-	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	✓		✓	✓	✓
CO2	✓	✓			✓
CO3	✓	✓	✓	✓	
CO4	✓		✓	✓	✓
CO5	✓	✓	✓	✓	

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224DA1A5CA	CORE-IX: COMPUTER NETWORKS AND COMMUNICATION	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Computer Networks 10 h

Introduction - Uses of Computer Networks - Types of Computer Networks - Network Technology form Local to Global- Example of Networks - Network Protocols - Reference models - OSI Reference : The TCP/IP Reference model - Standardization - Policy, Legal and Social issues - Case study on Network Layer Protocol

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: Design Issues - Error Detection and Correction - Data Link Protocols - Sliding Window protocol - Case study on Network topologies

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 IPV4 Protocol -IP Address: Subnets - CIDR - IPV6 - Case study on shortest path in a transport network

Unit IV Transport Layer 14 h

Introduction: Service of Transport Layer - Service Primitives : Connection Establishment - Connection Release - Error Control and Flow Control -Congestion control - UDP : Introduction - Remote Procedure Call - Real time transport protocol and control protocol- Case study on TCP-Targeted Denial of Service Attacks

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 – Case study on DNS Cache Poisoning Attacks

Text Books

- 1 Andrew S.Tanenbaum, (2022), "Computer Networks", (6th Edn.), Prentice Hall

References

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



Course Code	Course Name	Category	L	T	P	Credit
224AI1A5CA	CORE- X : MACHINE LEARNING TECHNIQUES	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental concepts of Machine Learning.
- The various methods and learning algorithms in ML.
- The underlying mathematical relationships within and across ML algorithms.

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 and techniques of Machine Learning.	K2
CO2	Illustrate the various supervised learning methods in ML.	K3
CO3	Illustrate the various unsupervised learning methods in ML	K3
CO4	Investigate the other learning techniques in machine learning	K3
CO5	Apply the ML algorithms in various real-time problems.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



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B.Sc. Artificial Intelligence and machine Learning (Students admitted during the AY 2022-23)

224AI1A5CA	CORE-X: MACHINE LEARNING TECHNIQUES	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Machine Learning 12 h

Introduction to Machine Learning- Types of Machine Learning - Applications of Machine Learning- Languages/Tools in machine Learning- Issues in Machine Learning. Modelling and Evaluation-Selecting a model-Training a model-Model Representation and Interpretability-Evaluating Performance of a Model.

Unit II Probability and Bayesian Concept Learning 12 h

Introduction - Concept of Probability - Random Variables - Common Discrete Distributions - Common Continuous Distributions - Multiple Random Variables - Sampling Distributions - Hypothesis Testing. Bayesian Concept Learning: Introduction - Bayes' Theorem - Bayes' Theorem and Concept Learning - Bayesian Belief Networks.

Unit III Supervised Learning 12 h

Introduction- Example of Supervised Learning- Classification Model- Classification Learning Steps- Common Classification Algorithms - Regression - Common Regression Algorithms-Polynomial Regression Model-Logistic Regression.

Unit IV Unsupervised Learning and Other types of Learning 12 h

Introduction- Unsupervised Vs Supervised learning- Application of Unsupervised Learning - Clustering - Types of Clustering - Finding Pattern using Association Rule - Apriori Algorithms- Association Rule. Introduction - Representation Learning - Active Learning - Instance-based Learning - Associate Rule Learning Algorithms - Ensemble Learning Algorithm - Regularization Algorithm.

Unit V Machine Learning Applications 12 h

Social Media Features-Product Recommendations-Image & Speech Recognition - Sentiment Analysis- Self-driving cars - Email Spam and Malware Filtering - Stock Market trading - Medical Diagnosis- Online Fraud Detection-Automatic Language Translation.



Text Books

- 1 Saikat Dutt ,Subramanian Chandramouli, Amit Kumar Das, (2019), "Machine Learning", (1st Edn.), Pearson India Education Services Pvt.Ltd. Unit: I – IV
- 2 Dr.Ruchi Doshi,Dr.Kamal Kant Hiran,Ritesh Kumar Jain,Dr.Kamlesh Lakhwani, (2022) "Machine Learning", (1st Edn.),BPB Publications. Unit:V

References

- 1 EthemAlpaydin, (2014),"Introduction to Machine Learning", (3rd Edn.), MIT Press, Prentice Hall of India
- 2 MehryarMohri, Afshin Rostamizadeh, AmeetTalwalkar,(2012), "Foundations of Machine Learning", (1st Edn.), MIT Press
- 3 Harsh Bhasin, (2020), "Machine Learning For Beginners", (2nd Edn.), Apress
- 4 Miroslav Kubat, (2015)," An Introduction to Machine Learning", (1st Edn.), Springer



Course Code	Course Name	Category	L	T	P	Credit
224AI1A5CB	CORE-XI: R PROGRAMMING	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basics of R and datatypes in R.
- Handling and exploring Data in R.
- Machine Learning algorithms.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics, Data types and handling data in R.	K1
CO2	Explain the methods to explore data into R.	K2
CO3	Illustrate Linear Regression and Decision Trees.	K3
CO4	Interpret Time Series Analysis and Clustering in R.	K3
CO5	Apply Association Rules and Text Mining in R.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



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B.Sc. Artificial Intelligence and machine Learning (Students admitted during the AY 2022-23)

224AI1A5CB	CORE-XI: R PROGRAMMING	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to R 13 h

Introduction to R: IDE's and Text Editors - Handling Packages in R - Working with Directory - Data types in R - Few commands for Data Exploration. Handling Data in R: Expression, Variables and Functions - Missing Values in R - Vectors - Matrices - Factors - List.

Unit II Exploring Data in R 12 h

Exploring Data: Introduction -Data Frames - R function for Understanding Data in Data Frames - Load Data Frames - Exploring Data - Data Summary - Finding the Missing Values - Invalid Values and Outliers - Descriptive Statistics - Spotting Problems in Data with Visualization.

Unit III Linear Regression and Decision Tree 11 h

Linear Regression: Introduction - Model Fitting - Validating Linear Assumption. Introduction: Terminologies Associated with Decision Trees - Decision Tree Representation in R - Appropriate problems for Decision Tree Learning - Basic Decision Tree Learning algorithms - ID3 Algorithm - Measuring Features. Case Study: Helping Retailers Predict In-store Customer Traffic.

Unit IV Time Series Analysis and Clustering 12 h

Time Series: Time Series Data-Reading Time Series Data-scan() Function-ts() Function - Plotting Time Series Data - Decomposing Time Series Data. Case Study: Insurance Fraud Detection. Clustering: Introduction - Basic concepts in Clustering - Hierarchical Clustering - k means algorithm. Case Study: Personalized product Recommendations

Unit V Association Rules and Text Mining 12 h

Association Rule Mining: Introduction - Frequent Itemset - Mining Algorithm Interfaces. Case Study: Making User generated Content Valuable. Text Mining: Definition of Text Mining - A Few Challenges in Text Mining - Text Mining Vs Data Mining - Text Mining in R - General Architecture of Text Mining Systems - Preprocessing of Documents in R - Core Text Mining Operations - Text Mining Query Languages.



Text Books

1. Seema Acharya, 2018, "Data Analytics Using R" ,1st Edition, Tata McGraw Hill Education (Unit I-V).

References

1. Richard Cotton, (2018), "Learning R", Seventh Indian Reprint, O'Reilly.
2. Hadley Wickham, Garrett Grolemund, (2020), "R for Data Science: Import, Tidy, Transform, Visualize, and Model Data", Fourth release, O'Reilly.
3. Norman Matloff, (2011), "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press.
4. Roger D. Peng, (2016), "R Programming for Data Science", Lulu.com.



224AI1A5CP	CORE PRACTICAL V: MACHINE LEARNING	SEMESTER V
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Total Credits: 2

Total Instructions Hours: 48 h

S.No	Contents
1	Illustrate the usage of the following methods in NumPy. mean (), median (), mode (), std (), percentile ()
2	Implement data distribution and normal data distribution using histogram.
3	Implement random data distribution using scatterplot.
4	Implement Linear and Polynomial Regressions.
5	Illustrate the Multiple Regression.
6	Program to implement a ML - Decision tree using Python.
7	Implement Hierarchical Clustering.
8	Implement Logistic Regression.
9	Create a confusion matrix using Python.
10	Implement K-means clustering algorithm.
11	Implement KNN algorithm.
12	Performance analysis of Classification Algorithms on a specific dataset (Mini Project).

Note: Out of 12 - 10 Mandatory



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224AI1A5SP	SEC PRACTICAL -III: DATA VISUALIZATION TECHNIQUES	SEMESTER V
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Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
1	Visualize data from Excel file as a Bar chart.
2	Program to Create a Scatter plot from CSV.
3	Visualization of Geographic Data with Maps.
4	Visualize Sales Performance as Dashboard.
5	Creation of Trellis Plots to visualize data.
6	Visualize Hierarchical Data with Dendrograms.
7	Dashboard display for website analytics.
8	Data visualization as a pie chart.
9	Visualization of data as Pivot table.
10	Display hierarchies in data as Treemap.
11	Visualize relationship between multiple variables as polar chart.
12	Display of data as Funnel chart.

Data sets:

1. [Dataset - Catalog](#)
2. [Global Health Observatory \(who.int\)](#)
3. [GeoPlatform.gov](#)
4. [Kaggle: Your Machine Learning and Data Science Community](#)

Suggested Tools:

Tableau / Power BI / R Studio

Note: Out of 12 - 10 Mandatory



Course Code	Course Name	Category	L	T	P	Credit
224AI1A5DA	DSE I: HUMAN COMPUTER INTERACTION	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- To know how to analyze and consider user's need in the interaction system
- To understand various interaction design techniques and models
- The cognitive aspects of human-machine interaction.

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 Human Computer Interaction.	K2
CO2	Analyze the design process in human interaction system.	K4
CO3	Implement the various evaluation Techniques of User Interaction.	K4
CO4	Evaluate the models and theories for HCI.	K3
CO5	Analyze the Applications of HCI.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



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B.Sc. Artificial Intelligence and machine Learning (Students admitted during the AY 2022-23)

224AI1A5DA	DSE-I: HUMAN COMPUTER INTERACTION	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Foundations of HCI 13 h

The Human: Input and Output Channels - Thinking - Emotion - The Computer: Text Entry Devices - Positioning, pointing and drawing - Display devices- The Interaction: Models of Interaction - Frameworks and HCI.

Unit II Design Process 11 h

Design - Process of Design - User focus - Scenarios - Navigation design: Local Structure and Global Structure - Screen Design and Layout: Tools for layout-User action and Control- Iteration and prototyping- Ergonomics.

Unit III HCI Software Process and Evaluation 12 h

Software Life cycle: Activities in life cycle-Design rules: Golden rules and Heuristics-HCI patterns -Evaluation techniques: Evaluation-Goal of Evaluation-Evaluation through Expert analysis -Choosing an Evaluation method.

Unit IV Models and Theories 12 h

Linguistic models: BNF-Task action grammar - Physical and device models: Keystroke level model- Three state model- Communication and Collaboration Models: Face to Face Communication - Text based Communication.

Unit V Applications of HCI 12 h

Groupware systems-Virtual reality: Technology- Immersive -Augmented reality - Current and Future application of VR - Information and Data Visualization- Hypertext, Multimedia, World Wide Web: Understanding Hypertext- Application area of hypermedia.



Text Books

- 1 Alan Dix, Janet Finlay, Gregory D Abowd and Russell Beale. (2019), "Human Computer Interaction", 3rd Edition, Pearson.

References

- 1 J. Preece, Y. Rogers, H. Sharp, D. Benyon, S. Holland and T. Carey. (2000), "Human Computer Interaction", 1st Edition, Addison Wesley.
- 2 D. R. Olson, (2009), "Human Computer Interaction", 1st Edition, Cengage Learning.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A5DB	DSE I: CLOUD COMPUTING SERVICES	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concept and evolution of cloud computing.
- The knowledge on the various issues in cloud computing.
- The emergence of cloud as the next generation computing paradigm.

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 cloud computing.	K2
CO2	Identify the cloud service providers for the deployment of cloud environment.	K2
CO3	Apply the various cloud service models and virtualization in real-time applications.	K3
CO4	Recognize the cloud databases and security mechanisms.	K2
CO5	Analyze the advanced cloud applications and case studies.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A5DB	DSE I: CLOUD COMPUTING SERVICES	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Cloud Computing 12 h

Introduction- Definitions- Properties and Characteristics - Benefits - Cloud Service and Deployment Models - Organization Scenario on Cloud - Cloud Architecture - Challenges in Cloud Computing - Cloud Supporting Services - Management and Administrative Services.

Unit II Cloud Service Providers 12 h

Infrastructure Service Providers: Amazon Web Services - Rackspace Cloud - Google Compute Engine - Microsoft Azure Services - Cloud Platform Setup Procedure- Platform Service Providers: Google App Engine - Microsoft Azure - Cloud Foundry - Salesforce.com- Cloud Platform Setup Procedure.

Unit III Software Service Providers and Virtualization 12 h

Software Service Providers: Free Cloud Panda - iCloud.com - Mint.com - eyeOS- Advanced SaaS Products - Cloud Platform Setup Procedure - Virtualization: Overview - x86 Virtualization - Types - Virtualization Products - Virtual LAN - Virtual SAN - Cloud Interoperability Standards.

Unit IV Cloud Databases and Security 12 h

Cloud Database - Operation Model - Types of Cloud Database - Cloud File System - Cloud Programming Model - MapReduce Programming - Cloud Security: Fundamentals - Cloud Risk Division - Cloud Computing Security Architecture - VM Security Challenges - Vulnerability Assessment Tools for Cloud.

Unit V Cloud Technologies and Advancements 12 h

MapReduce Programming model -Open Stack -Apache Hadoop ecosystem- Architecture of Hadoop -Adoption of cloud computing -Factors affecting cloud computing adoption - Applications- Case Study on cloud Services.



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Text Books

- 1 Rishabh Sharma, (2017), "Cloud Computing - Fundamentals, Industry Approach and Trends", (1st Reprint), Wiley. Unit: I – IV
- 2 Kamal Kant Hiran, Ruchi Doshi Temitayo Fagbola, Mehul Mahrishi, (2019), "Cloud Computing "(1st Edn.), BPB Publication, India. Unit: V

References

- 1 Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, (2013), "Mastering Cloud Computing", (1st Edn.), TMH.
- 2 Rittinghouse, John W., and James F. Ransome, (2017), "Cloud Computing: Implementation, Management and Security", (2nd Edn.), CRC Press.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A5DC	DSE I: SOFTWARE ENGINEERING PRINCIPLES	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The software process models to design a system.
- The architectural and detailed design methods.
- To apply software testing and quality assurance techniques at the module level to ensure good quality software.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify an effective software engineering process to develop software-intensive systems.	K2
CO2	Interpret the requirements specification into an implementable design.	K2
CO3	Understand design concepts and principles.	K2
CO4	Assess the system using various testing strategies.	K3
CO5	Develop the software system with quality measures.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



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B.Sc. Artificial Intelligence and machine Learning (Students admitted during the AY 2022-23)

224AI1A5DC	DSE I: SOFTWARE ENGINEERING PRINCIPLES	SEMESTER V
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Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Software Engineering Fundamentals 12 h

Nature of software- Software Process- Software engineering Practice -Process Pattern- Prescriptive process models: Waterfall Model-Incremental Process Model-Evolutionary Model-Concurrent Models- Specialized process models-Personal and Team process model- Unified Process -Product and Process.

Unit II Agile Development 11 h

Agility - Agile Process: Principles - Politics of Agile development- Extreme Programming: XP Process- Industrial XP- Other Agile process models: Scrum-Dynamic systems Development Method-Agile Modeling- Agile unified process - Agile Teams-Tool set for agile process.

Unit III Software Requirement Analysis and Design 13 h

Requirements engineering- Establishing the groundwork- Eliciting Requirements- Negotiating Requirements -Validating Requirements-Design Process-Design Concepts-Design model: Data Design -Architectural Design-Interface Design - Component level design -Deployment level design.

Unit IV Software Testing Strategies 12 h

Strategic Approach to Software Testing -Test strategies for Conventional software: Unit Testing-Integrated Testing-Validation Testing-System Testing-Internal and External views of testing- Basis path testing- Control Structure Testing- Art of Debugging-Testing for Real-time systems- Software Testing Tools.

Unit V Quality Assurance and Management 12 h

Quality- Software Quality- Achieving Software Quality- Software Quality assurance (SQA): Elements- SQA Formal Approaches-SQA Plan- Quality standards: ISO 9000- Plan of SQA- Software Configuration Management: Elements-SCM Features, Process- SPI Approaches-SPI Process - Other SPI Framework- SPI Trends.



Text Books

- 1 Roger S.Pressman, Bruce R.Maxim, (2019), "Software Engineering: A Practitioner's Approach", 8th Edition, McGraw-Hill.

References

- 1 Ian Sommerville (2017), "Software Engineering", Tenth Edition, Pearson Education Ltd.
- 2 Richard Fairley (2017)," Software Engineering Concepts", Mc-Graw Hill Education.
- 3 Rajib Mall (2014)," Fundamentals of Software Engineering", 4th Edition, Prentice Hall, India Learning Private Limited



224AI1A5GA	GE : AI ESSENTIALS	SEMESTER V
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Artificial Intelligence 04 h

Introduction - History - Structure of AI- Data- Types of data- Database -Data Process- Intelligent Agents (IA) - Ethics and Governance.

Unit II Machine Learning 05 h

Introduction to Machine Learning - Machine Learning Process-Supervised Learning -Unsupervised Learning - Reinforcement Learning - Semi-Supervised Learning - Types of Machine Learning algorithms.

Unit III Deep Learning 05 h

Introduction to Deep Learning -Difference between deep learning and machine learning- Artificial Neural Networks (ANN) - Convolutional Neural Networks (CNN) - Deep Learning Applications.

Unit IV Natural Language Processing 05 h

Introduction to Natural Language Processing (NLP) - Challenges of NLP - Voice Recognition - NLP in real world - Future of NLP.

Unit V Advancements and applications of AI 05 h

Healthcare - Cyber Security - Agriculture - Education - Automobile - Banking and Finance - Manufacturing and Design.

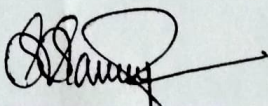



Text Books

- 1 Tom Taulli, 2019, "Artificial Intelligence Basics: A Non - Technical Introduction ", (1st Edn), Tom Taulli Monrovia, CA, USA. Unit: I-IV.
- 2 Utpal Chakraborty, 2020, "Artificial Intelligence for all", (1st Edn), BPB Publications, New Delhi. Unit: V.

References

- 1 Dr Ruchi Doshi, 2022, "Machine Learning", BPB Publications, New Delhi.
- 2 Elaine Rich, Kevin Knight and Shiv Shankar B. Nair, (2009)," Artificial Intelligence (SIE)", (3rd Edn.), Tata McGraw Hill
- 3 Er Rajiv Chopra, 2014, "Artificial Intelligence- A Practical Approach", S Chand & Company Pvt Ltd, New Delhi.


 BoS Chairman / HoD
 Department of Artificial Intelligence and Machine Learning
 Dr. N.G.P. Arts and Science College
 Coimbatore - 641 048.

 Dr.N.G.P. Arts and Science College		
APPROVED		
BoS- 5th 4/4/24	AC- 17th 17/4/24	GB-



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6CA	NATURAL LANGUAGE PROCESSING	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- fundamental concepts of NLP.
- various NLP techniques to solve real-time problems.
- linguistic data from various language resources.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	understand the fundamental concepts of Language Processing.	K2
CO2	learn text processing to write structured programs.	K2
CO3	recall the various types of tagging and classifications of texts.	K3
CO4	apply information extraction techniques.	K3
CO5	explore the NLP applications for processing linguistic information.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/Pos	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓		✓	
CO2		✓	✓	✓	✓
CO3	✓	✓		✓	
CO4		✓		✓	✓
CO5	✓		✓		✓

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A6CA	NATURAL LANGUAGE PROCESSING	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Language Processing 10 h

Computing with Language: Introduction - Texts and Words, Texts as Lists of Words, Statistics, Automatic Natural Language Understanding - Accessing Text Corpora - Lexical Resources - WordNet.

Unit II Text Processing and Structured Programs 10 h

Accessing Text from the Web and Disk - Strings - Text Processing with Unicode- Regular Expressions and its Applications- Normalizing Text - Segmentation - Formatting Lists - Sequences - Functions - Program Development.

Unit III Tagging and Classification 10 h

Introduction - Tagger - Tagged Corpora, Mapping Words to Properties, Automatic Tagging, N-Gram Tagging, Transformation based Tagging - Learning to Classify Text: Supervised Classification - Examples.

Unit IV Information Extraction 9 h

Introduction - Chunking - Developing and Evaluating Chunkers - Recursion in Linguistic Structure - Named Entity Recognition - Relation extraction - Analyzing Sentence Structure: Grammatical Dilemmas, Use of Syntax, Context-Free Grammar, Parsing.

Unit V Managing Linguistic Data 9 h

Natural Language Understanding - Propositional Logic - First Order Logic - Semantics of English Sentences - Discourse Semantics - Corpus Structure - Corpus Life cycle - Acquiring Data - Working with XML - Working with Toolbox Data.



Text Books

- 1 Steven Bird, Ewan Klein & Edward Loper, 2021, "Natural Language Processing with Python", Reprint, 1st Edition, Shroff Publishers Pvt. Ltd.

References

- 1 Daniel Jurafsky, 2022, "Speech And Language Processing: An Introduction To Natural Language Processing, Computational Linguistics And Speech Recognition", 1st Edition, Pearson India - Noida.
- 2 Tanveer Siddiqui, U S Tiwary, 2019, "Natural Language Processing and Information Retrieval", 1st Edition, Oxford University Press.
- 3 Sunil Patel, 2021, "Getting Started with Deep Learning for Natural Language Processing (NLP)", 1st Edition, BPB - New Delhi.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6CB	CYBERSECURITY ESSENTIALS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- basic concepts of Cybersecurity
- intrusion detection in network and information security
- cyber attacks and Vulnerabilities

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	understand cybersecurity and cybercrime	K2
CO2	learn types of intrusion detection system	K3
CO3	outline the sources of cybercrime	K3
CO4	apply the different detection and tracking approaches	K3
CO5	predict and trace the various cyber attacks	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A6CB	CYBERSECURITY ESSENTIALS	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Cyberspace and Cybersecurity 10 h

Introduction: Cyberspace and Cyber Security- Standards and Best Practices - Standard for Information Security - ISO IEC 27000 - National Institute of Standards and Technology Cybersecurity Framework and Security Documents - Security Controls for Effective Cyber Defense - COVID 5 for Information Security.

Unit II Information Security 10 h

Critical National Infrastructure - Confidentiality - Integrity - Availability Triad - Defensive Lifecycle - Intrusion and its types - Intrusion Detection System(IDS) - Characteristics - Types of Intrusion Detection System: Host based IDS, Network Based IDS - Intrusion Detection and Prevention Principles.

Unit III Cybercrime Source Identification Techniques 10 h

Cyber Forensic - Intrusion activities - Attribution and Traceback - Attribution Difficulty - Assumptions - IP address and Traceback mechanism - Classification of Traceback Schemes - Evaluation of IP Traceback Schemes - Active Response Characteristics - Sleepy Watermark Tracing.

Unit IV Stepping Stone Detection System 9 h

Accountability - Stepping Stones - Timing Based Stepping Stone Detection Approach - Brute Force Content Based Algorithm - Simple Content Based Algorithm - Anomaly Detection Techniques.

Unit V Infrastructural Vulnerabilities 9 h

Flooding Attacks: Commercial-Off-The-Shell (COTS) Software and Internet Security - Shortfalls in Internet Structure - Cooperative Intrusion Traceback and Response Architecture - Distributed Denial of Service (DDoS) Flooding Attacks - DDoS Attacks on OSI Layers - Cyberwar.



Text Book

- 1 Rajesh Kumar Goutam, 2021, "Cybersecurity Fundamentals", 1st Edition, BPB Publications.
- 2 William Stallings, 2018, " Effective Cybersecurity: A Guide to Using Best Practices and Standards", 1st Edition, Adison Wesley Professional.

References

- 1 Kutub Thakur, Al-Sakib Khan Pathan, 2020, "Cybersecurity Fundamentals: A Real-World Perspective", 1st Edition, CRC Press
- 2 Pascal Ackerman, 2020, "Modern Cybersecurity Practices", 1st Edition, BPB Publications
- 3 Charles J. Brooks, Christopher Grow, Philip Craig, Donald Short, 2018, "Cybersecurity Essentials", 1st Edition, John Wiley & Sons
- 4 Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed, 2017, "Fundamental of Cyber Security", 1st Edition, BPB Publications



224AI1A6SP	NATURAL LANGUAGE PROCESSING USING PYTHON	SEMESTER- VI
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Total Credits: 2

Total Instructions Hours: 48h

S.No	List of Experiments
1	Program to Tokenize text in NLTK.
2	Program to Remove the Stop words in NLTK.
3	Program to perform Lemmatization.
4	Implement Stemming words.
5	Implement Word similarity in NLP.
6	Program to implement Entity extraction algorithm.
7	Demonstrate Sentiment Analysis in NLTK.
8	Program to create a text and convert it into Speech using functions.
9	Demonstrate Speech to text API.
10	Implement a simple Chatbot using NLTK.
11	Implement the Cloud NLP API in Google Cloud.
12	Program to filter the email in spam folder.
13	Implement Text Normalization.
14	Program to perform Part-of-Speech (POS) Tagging in NLP.
15	Demonstrate Relation extraction algorithm.
16	Implement Topic Modeling in NLP.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6DA	DEEP LEARNING TECHNIQUES	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- foundational concepts of deep learning.
- neural network architecture.
- the training of deep neural networks.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	recall the key concepts of machine learning and evaluation models.	K2
CO2	understand various neural network architectures.	K3
CO3	apply training techniques for deep neural networks.	K3
CO4	analyze convolutional neural networks for image tasks.	K3
CO5	develop recurrent neural networks for sequence-based applications.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A6DA	DEEP LEARNING TECHNIQUES	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48h

Syllabus

Unit I Machine Learning 9h

Introduction- Traditional Computer Programming - Types of Machine Learning- Process of Machine Learning - Evaluating the model - Model Representation and Interpretability - Concept of Loss Functions - Limitation of Machine Learning.

Unit II Fundamentals of Neural Network 9h

Biological Neuron-Exploring the Artificial Neuron - Implementation of Artificial Neural Network (ANN) - Types of Activation Functions - Architectures of Neural Network: Single Layer Feed Forward Network, Multi-layer Feed Forward ANN, Recurrent Network, Convolutional Network - Learning Process in ANN - Deep Neural Network.

Unit III Training Deep Neural Network 10h

Deep L-Layer Neural Network - Notion of Forward and Backward Propagation- Initializing weights in Neural Network - Optimization Algorithms - Regularization- Normalization of Inputs.

Unit IV Convolutional Neural Network 10 h

Building blocks of Convolutional Neural Network (CNN): Kernel - Image Convolution - Pooling - Hood of CNN - Comparing CNN with traditional ANN - CNN Architectures: LeNet5, AlexNet, VGG16, ResNet - Object detection.

Unit V Sequence Based Models 10h

Sequence of data - Types of tasks in sequence - Recurrent Neural Network (RNN) - Data preparation for RNN - Vanishing Gradient Problem and RNN - Long short-term Memory - Gated Recurrent Units - Bi-directional models - Languages Modelling and Sequence models - Case Study.



Text Books

- 1 Amit Kumar Das, Saptarsi Goswami, Prabitra Mitra, Amlan Chakrabarti 2022," Deep Learning ", Fourth Edition, Pearson India Education Services Pvt Ltd.

References

- 1 Nikhil Buduma, 2019, "Fundamentals of Deep Learning", 1st Edition, O'reilly Media Inc.
- 2 M. Gopal ,2023, "Deep learning: Core Concepts, Methods and Applications", 3rd Edition, Pearson India Education Services Pvt Ltd.
- 3 Shashidhar Soppin, 2023," Essentials of Deep Learning and AI", 1st Edition, BPB New Delhi.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6DB	INTERNET OF THINGS AND SMART SYSTEMS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the foundations of IoT.
- the factors that contributed to the emergence of IoT.
- to design and program IoT devices for real-time problems.

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 IoT and its enabling technologies.	K2
CO2	learn machine to machine networking and system management.	K2
CO3	understand the building blocks of the IoT physical devices.	K2
CO4	analyze data analytics for IoT	K3
CO5	examine the potential business opportunities that IoT can uncover.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A6DB	INTERNET OF THINGS AND SMART SYSTEMS	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Internet of Things 10 h

Introduction: Internet of Things (IoT) - Characteristics - Physical Design: Things in IoT- Protocols - Logical Design: Functional Blocks, Communication Models, Communication APIs - IoT Enabling Technologies: Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Embedded Systems.

Unit II Machine to Machine and System Management 10 h

Machine to Machine (M2M) - Difference between IoT and M2M - Software Defined Networking - Network Function Virtualization - System Management: Simple Network Management Protocol, Network Configuration Protocol (NETCONF), YANG - Design methodology - Case Study.

Unit III Physical Devices 10 h

Building blocks of an IoT device - Raspberry Pi Board - Raspberry Pi Interfaces - Programming Raspberry Pi - Designing a RESTful Web API - Amazon web services for IoT: EC2, AutoScaling, S3, RDS, DynamoDB.

Unit IV IoT Enabling Platforms 9 h

Edge Device Platforms - IoT Gateway Devices - IoT Cloud Platforms - IoT Application Platforms - Processors - Softwares: OpenWSN, TinyOS, FreeRTOS, Contiki.

Unit V Security and Privacy 9 h

Security Issues and Threat Models - Security Mechanisms - Privacy Issues - End to End Communication Security - Applications: Home Automation: Smart lighting, Smart Appliance Intrusion Detection -Smoke detectors. Cities: Smart parking- Smart roads- Surveillance - Environment- Energy -Agriculture- Industry- Health.



Text Books

- 1 Vijay Madiseti and Arshdeep Bahga, 2021, "Internet of Things: A Hands-on Approach", 1st Edition, Reprint, University Press India Pvt. Ltd.
- 2 K. N. Raja Rao, 2021, "Internet of Things-Concepts and Applications", 1st Edition, Wiley India Pvt. Ltd.

References

- 1 Michael Margolis, 2020, "Arduino Cookbook: Receipes to begin, Expand and Enhance Your Projects", 3rd Edition, SPD sss- New Delhi.
- 2 James R Strickland, 2023, "Raspberry Pi For Arduino Users: Building IoT and Network Applications And Devices", 1st Edition, Apress - New Delhi.
- 3 Kamlesh Lakhwani, Gianey and Wireko, 2020, Internet Of Things (IOT), 1st Edition, BPB - New Delhi.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6DC	SERVICE ORIENTED ARCHITECTURE	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the fundamentals of Service Oriented Architecture.
- the Analysis, Design and Technologies of Service Oriented Architecture.
- the concept of Cloud Computing with Service Oriented Architecture.

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 Service Oriented Architecture.	K1
CO2	learn the Enterprise applications.	K2
CO3	analysis and design of Service Oriented Architecture. Applications.	K2
CO4	interpret the technologies in Service Oriented Architecture. governance.	K1
CO5	implement the cloud services with Service Oriented Architecture.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/Pos	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓			✓
CO2		✓		✓	✓
CO3	✓	✓			
CO4	✓		✓		✓
CO5	✓	✓		✓	✓

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input checked="" type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A6DC	SERVICE ORIENTED ARCHITECTURE	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 8 h

Service Oriented Architecture (SOA): Service Orientation - Evolution of SOA - Drivers for SOA - Dimensions - Key Components - Perspectives - Enterprise Wide SOA: Considerations - Strawman Architecture - Enterprise SOA Layers - Application Development Process - SOA Methodology.

Unit II Enterprise Applications 10 h

Architectural Considerations- Architecture for enterprise Applications- Software Platforms: Packaged Application - Enterprise Application: Application Server - Java Platform Enterprise Edition - .NET Application Platform.

Unit III Analysis and Design 10 h

Service Oriented Enterprise Applications: Pattern - Pattern Based Architecture - Composite Applications - SOA Programming Models - Service oriented Analysis and Design: Models - Principles of Service Design - Design of Activity Services - Design of Data Services - Design of Client Services - Design of Business Process Services.

Unit IV Technologies and SOA Governance 10 h

SOA Technologies: Service Enablement - Service Integration - Service Orchestration - SOA Governance: Strategic Architecture - Development of Services - SOA Security - Implementation: Enterprise Strategy - TO-BE Strategy - SOA Development - SOA Deployment and Monitoring.

Unit V Cloud with SOA 10 h

Introduction: Cloud Computing Paradigm-Types of Cloud Technologies- Opportunities- Cloud Service Providers- SOA with Cloud Services: Enablement Services - Implementation of SOA with Enterprise and Cloud Services.



Text Books

- 1 Shankar Kambhampaty, 2012, "Service Oriented Architecture for Enterprise and Cloud Applications", 2nd Edition, Wiley India Pvt. Ltd, New Delhi.

References

- 1 Dr. Kirti Seth, Dr. Ashish Seth, 2020, "Understanding Service-Oriented Architecture (SOA)", 1st Edition, BPB Publications, India.
- 2 Thomas Erl, 2005, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6DD	FUZZY LOGIC AND NEURAL NETWORKS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Fuzzy Systems for decision making
- biological motivation to design intelligent systems and control using Neural Networks
- Neural Network Architectures, Algorithms and Applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	exemplify the skills in understanding on Fuzzy Sets	K2
CO2	Understand Fuzzy Systems	K2
CO3	analyze learning strategies of Back propagation and Recurrent Network	K3
CO4	learn Self-Organizing Maps for Dimensionality Reduction	K2
CO5	Connect the Neural Networks in Problem solving via applications	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/Pos	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓			
CO2	✓	✓	✓		✓
CO3	✓	✓	✓		
CO4	✓	✓	✓		
CO5	✓	✓			✓

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A6DD	FUZZY LOGIC AND NEURAL NETWORKS	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fuzzy set Theory 9 h

Introduction - Fuzzy versus Crisp - Crisp Sets – Operations – Properties - Partition and Covering- Fuzzy Sets: Membership Functions- Operations- Properties- Crisp Relations - Fuzzy Relations.

Unit II Fuzzy Systems 9 h

Crisp Logic - Predicate Logic - Fuzzy Logic: Quantifiers – Inference - Fuzzy Rule Based System - Defuzzification Methods - Applications.

Unit III Back Propagation and Recurrent Networks 10 h

Multi-layer Feed Forward Networks- Generalized Delta Rule- Working with Back Propagation- Activation Functions- Deficiencies of Back Propagation- Advanced Algorithms- Applications- Recurrent Networks: Generalised Delta Rule in Recurrent Networks - Hopfield Network- Boltzmann Machines.

Unit IV Self-Organizing Maps 10 h

Competitive Learning: Clustering- Vector Quantisation- Counter Propagation- Learning Vector Quantisation- Kohonen Network- Principal Component Networks: Normalized Hebbian Rule- Principal Component Extractor- Eigenvectors- Adaptive Resonance Theory.

Unit V Reinforcement Learning 10 h

Introduction: Controller Network- Barto's Approach: Associative Search- Adaptive Critic- Cart Pole System- Reinforcement Learning versus Optimal Control- Neural Network Applications.



Text Books

- 1 S.Rajasekaran, G.A. Vijayalakshmi Pai, 2014, "Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications" 7th Edition, PHI Publications.
- 2 Chennakesava R Alavala., 2013, "Fuzzy Logic and Neural Networks: Basic Concepts & Applications" 1st Edition, New Age International Publishers.

References

- 1 Dr.C. Naga Bhaskar., Prof.G. Vijay Kumar, 2020, "Neural Network and Fuzzy Logic" 1st Edition, BS Publications
- 2 M Amirthavalli, 2014, "Fuzzy logic and Neural Networks", 1st Edition, SCITECH Publications (India) Pvt. Ltd.
- 3 S N Sivanandam, S Sumathi., S N Deepa., 2020, "Introduction to Neural Networks using MATLAB 6.0" 1st Edition, McGraw Hill (India) Pvt. Ltd.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6DE	PRINCIPLES OF ROBOTICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- fundamental concepts of Robotics
- components and Classification of Robots
- Kinematics concepts of speed, velocity, displacement and acceleration

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	understand the Fundamental Concepts of Robotics	K2
CO2	learn about sensors and actuators in robotic application	K2
CO3	analyze the access of grippers and the selection of grippers	K3
CO4	utilize the concept of robot perception and navigation using Vision, Sensors and Signal Conditioning	K3
CO5	apply the principles of Kinematics for robot planning and controlling	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/Pos	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓			
CO2	✓	✓	✓		✓
CO3	✓	✓	✓		✓
CO4	✓	✓	✓		
CO5	✓	✓			

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input checked="" type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/ Human Values/ Ethics



224AI1A6DE	PRINCIPLES OF ROBOTICS	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Robotics 8 h

Introduction: Robots- Robot Usage- Industrial Robots: Robot Subsystem- Motion Subsystem- Recognition Subsystem- Control Subsystem- Classification of Robots- Industrial Applications.

Unit II Actuators and Grippers 10 h

Actuators: Electric Actuators, Hydraulic Actuators, Pneumatic Actuators- Selection of Motors- Grippers: Mechanical Grippers, Magnetic Grippers, Vacuum Grippers, Adhesive Grippers, Selection of Grippers.

Unit III Sensors, Vision and Signal Conditioning 10 h

Sensor Classification- Internal Sensors: Position Sensor, Velocity Sensor, Acceleration Sensor, Force Sensor- External Sensors: Contact Type- Non contact Type- Vision- Signal Conditioning- Sensor Selection.

Unit IV Transformations 10 h

Robotic Architecture- Pose of a rigid body- Coordinate Transformations- Denavit and Hartenberg (DH) Parameters- A Variant of DH parameter- DH parameterization of Euler Angles.

Unit V Kinematics 10 h

Forward Position Analysis- Inverse Position Analysis. Velocity Analysis: The Jacobin Matrix- Link Velocities- Jacobin Computation- Forward and Inverse Velocity Analysis- Acceleration Analysis.



Text Books

- 1 S K Saha, 2016, " Introduction to Robotics", 2nd Edition, McGraw Hill Education.

References

- 1 John J. Craig, 2016, " Introduction to Robotics: Mechanics and Control", 3rd Edition, Pearson Education International.
- 2 Jisu Elsa Jacob, 2023, " Robotics Simplified", 1st Edition, BPB-New Delhi.
- 3 Lentin Joseph, 2023, " Robot Operating System (ROS) for Absolute Beginners: Robotics Programming Made Easy", 2nd Edition, APRESS Media, LLC-California.



Course Code	Course Name	Category	L	T	P	Credit
224AI1A6DF	UI AND UX DESIGN	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the fundamentals of User Interface Design.
- the importance of User Experience Design.
- the strategies in UI and UX Design.

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 UI Design.	K2
CO2	illustrate the different types of processes involved in UI Design.	K2
CO3	learn the Interface and Screen Design.	K3
CO4	apply the various System Menus and Navigation Schemes.	K3
CO5	analyze the Principles of UX Design.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

<input checked="" type="checkbox"/>	Skill Development	<input type="checkbox"/>	Entrepreneurial Development
<input checked="" type="checkbox"/>	Employability	<input type="checkbox"/>	Innovations
<input type="checkbox"/>	Intellectual Property Rights	<input type="checkbox"/>	Gender Sensitization
<input type="checkbox"/>	Social Awareness/ Environment	<input type="checkbox"/>	Constitutional Rights/Human Values/Ethics



224AI1A6DF	UI AND UX DESIGN	SEMESTER VI
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Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I User Interface 10 h

User Interface - Importance of Good Design – Benefits - Human Computer Interface - Graphical User Interface - Screen Design - Characteristics of Graphical and Web User Interface - Principles of User Interface Design.

Unit II User Interface Design Process 10 h

Obstacles and Pitfalls in the Development Path - Designing for People – Usability: Usability Problems, Practical Measures, Objective Measures - Human Action Cycle - Responses to Poor Design - Human Characteristics in Design.

Unit III Interface Design 10 h

Interface Design Goals - Test for a Good Design – Consistency - Ordering of Data and Content - Navigation and Flow - Web sites and Web Pages - Intranet Design - Extranet Design.

Unit IV System Menus and Navigation 08 h

System Menus: Structures, Functions, Content, Formatting, Phrasing - Selecting Menu Choices - Web Site Navigation - Graphical Menus - Components of a Window -Presentation Styles.

Unit V User Experience Design 10 h

User Experience (UX) - Misconceptions of UX Design - Disciplines of User Experience - Importance of User Experience - UX from the Business Perspective - Various States of UX Maturity – RoI of UX Design - Mobile Application Designing.



Text Books

- 1 Wilbert O. Galitz, 2017, "The Essential Guide to User Interface Design ", 3rd Edition, Wiley Publishing, Inc.
- 2 Westley Knight, 2019, "UX for Developers: How to Integrate User-Centered Design Principles into Your Day-to-Day Development Work" 1st Edition, Apress Media.

References

- 1 James Cabrera, (2017), "Modular Design Frameworks: A Projects-based Guide for UI/UX Designers", Apress.
- 2 Pamala B. Deacon, 2020, "UX and UI Strategy: A Step by Step Guide on UX and UI Design", CRC press.
- 3 Theresa Neil, 2012, "Mobile Design Pattern Gallery", 1st Edition, Oreilly Media, Inc.



Course Code	Course Name	Category	L	T	P	Credit
223BC1A6AA	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 a career option

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
sssCO1	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		✓	✓		✓
CO2				✓	✓
CO3	✓		✓		
CO4		✓	✓		✓
CO5	✓			✓	

COURSE FOCUSES ON

<input checked="" type="checkbox"/> Skill Development	<input checked="" type="checkbox"/> Entrepreneurial Development
<input checked="" type="checkbox"/> Employability	<input checked="" type="checkbox"/> Innovations
<input checked="" type="checkbox"/> Intellectual Property Rights	<input type="checkbox"/> Gender Sensitization
<input checked="" type="checkbox"/> Social Awareness/ Environment	<input checked="" type="checkbox"/> Constitutional Rights/ Human Values/ Ethics



223BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	SEMESTER VI
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Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Innovation 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 and International 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 -Validity of patent- Infringement of Patent.

Case Study: Apple Inc. v. Samsung Electronics Co. Ltd. (2020)

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: Merck v. Mylan Pharmaceuticals (2016)

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: J.K. Rowling and Warner Bros. v. Steve Vander Ark (2007)

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: Darjeeling Tea v. Tea Board of India (2012).

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


Text Books

- 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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