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

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)
Approved by Government of Tamil Nadu and Accredited by NAAC with 'A++' Grade (3rd Cycle-3.64 CGPA)
Dr. N.G.P. – Kalapatti Road, Coimbatore-641048, Tamil Nadu, India
Web: www.drngpasc.ac.in |Email: info@drngpasc.ac.in | Phone: +91-422-2369100

REGULATIONS 2022-23 for Under Graduate Programme

(Outcome Based Education model with Choice Based Credit System)

B.Sc Mathematics Degree

(For the students admitted during the academic year 2022-23 and onwards)

Programme: B. Sc., Mathematics

Eligibility:

Candidate for admission to the first year of the **B.Sc. Mathematics** degree course shall be required to have passed the higher secondary examination conducted by the Govt. of Tamil Nadu with Mathematics as one of the subjects are only eligible or other examinations accepted as equivalent there to by the academic council, subject to such other conditions as may be prescribed there for. Business Mathematics, General Mathematics and Statistics subject at HSC cannot be considered as equivalent to Mathematics.

Programme Educational Objectives:

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

1. Mathematics is the key to success in the field of science and engineering.
2. Today, the students need a thorough knowledge of fundamental basic principles, methods, results and a clear perception of the power of mathematical ideas and tools to use them effectively in modeling, interpreting and solving the real world problems.
3. Mathematics plays an important role in the context of globalization of Indian economy, modern technology and we find the applications of Computers in all walks of life from Agriculture to Atomic research.
4. This course is aimed at preparing the students to cope with the latest developments and compete with students from other universities and put them on the right track.

PROGRAMME OUTCOMES:

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

PO Number	PO statement
PO1	The learner will able to relate the concept underlying standard applications of Mathematics, Physics and Statistics
PO2	The learner will have an understanding on basic pure and applied Mathematics and able to formulate the Mathematical arguments in logical manner
PO3	The learner can be able to illustrate Mathematical concepts effectively by oral, written,computing and graphical means
PO4	The learner will make use of the theories of Mathematics and their applications in real world problems
PO5	The learners can be able to identify the complex physical problems and apply the Mathematical techniques to solve them

Credit distribution

For students admitted in AY 22-23 and onwards.
Credit distribution for all UG programmes

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 2,3,4,5)	17	70	I to VI
	Inter Departmental Course (IDC)	4	16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course(SEC)	4	8	III ,IV,V& VI
	Industrial Training	1	2	V
IV (8 Credits)	Environmental Studies(AECC)	1	2	I
	Basic Tamil/ Advance Tamil /Human Rights &Women's Rights(AECC)	1	2	II
	Innovation & IPR/Innovation, IPR &Entrepreneurship (AECC)	1	2	VI
	Generic Elective(GE) (AEEC)	1	2	V
V (2 Credits)	NSS/NCC/YRC/RRC/Yoga/Sports/Clubs	-	2	I -II
TOTAL CREDITS			**142**	

CURRICULUM

PROGRAMME NAME – B. Sc. Mathematics

Course Code	Course Category	Course Name	L	T	P	Exam (h)	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										
222MT1A1CA	Core-I	Calculus with Scilab	4	2	-	3	50	50	100	4
222MT1A1CB	Core-II	Analytical Geometry with GEOGEBRA	4	1	-	3	50	50	100	4
222PY1A1IP	IDC-I	Modern Physics	3	-	4	3	50	50	100	5
Part – IV										
223MB1A1AA	AECC-I	Environmental Studies	2	-	-	-	50	-	50	2
Part – V										
222MT1A1XA	Extension Activity	NSS/NCC/ YRC/RRC/ Yoga/Sports/Club	-	-	-		50	-	50	1
Total			21	4	5				600	22

BoS Chairman/HoD
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Dr. N. G. P. Arts and Science College
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BoS- 13th 05.08.22 | AC - 13th 06.9.22 | GB - 18th 10.9.22

Academic Council
Dr.V. Rajendran
CHAIRMAN
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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 Illakkiyam	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										
222MT1A2CA	Core-III	Differential Equations	4	2	-	3	50	50	100	4
222MT1A2CB	Core-IV	Fourier Series and Integral Transforms	4	1	-	3	50	50	100	4
222PY1A2IP	IDC-II	Applied Physics	3	-	4	3	50	50	100	5
Part – IV										
221TL1A2AA/ 221TL1A2AB/ 225CR1A2AA	AECC-II	Basic Tamil/ Advanced Tamil/ Human Rights and Women's Rights	2	-	-	-	50	-	50	2
Part – V										
222MT1A2XA	Extension Activity	NSS/NCC/ YRC/RRC/ Yoga/Sports/Clubs	-	-	-	-	50	-	50	1
Total			21	4	5				600	22

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19.11.22	19.01.23	30.01.23

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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										
222MT1A3CA	Core V	Mechanics	4	1	-	3	50	50	100	4
222MT1A3CB	Core – VI	Probability Theory	4	1	-	3	50	50	100	4
222MT1A3CC	Core – VII	Numerical Methods	4	-	-	3	50	50	100	4
225CI1A3IA	IDC - III	Business Accounting	3	1	-	3	50	50	100	3
222MT1A3SA	SEC - I	Optimization Techniques	2	2	-	3	50	50	100	2
Total			23	7	-				700	23

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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										
222MT1A4CA	Core - VIII	Elements of Mathematical Analysis	4	1	-	3	50	50	100	4
222MT1A4CB	Core – IX	Mathematical Statistics	4	1	-	3	50	50	100	4
222MT1A4CC	Core – X	Mathematical Modeling	4	-	-	3	50	50	100	4
224DA1A4IA	IDC - IV	Introduction to Data Science	3	1	-	3	50	50	100	3
222MT1A4SA	SEC-II	Advanced Optimization Techniques	2	2	-	3	50	50	100	2
Total			23	7	-				700	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										
222MT1A5CA	Core – XI	Modern Algebra	4	-	-	3	50	50	100	4
222MT1A5CB	Core – XII	Real Analysis	4	1	-	3	50	50	100	4
222MT1A5CC	Core – XIII	Number Theory	4	-	-	3	50	50	100	4
222MT1A5EP	Core – XIV Practical	Programming in MATLAB	3	-	4	3	50	50	100	5
222MT1A5SP	SEC – III Practical	R Programming	-	-	4	3	50	50	100	2
222MT1A5DA	DSE-I	Fuzzy sets and Fuzzy Logic	4	-	-	3	50	50	100	4
222MT1A5DB		Discrete Mathematics								
222MT1A5DC		Mathematical Foundations in Cryptography								
222MT1A5TA	IT	Industrial Training	-	-	-	-	50	50	100	2
Part – IV										
	GE		2	-	-	-	50		50	2
Total			21	1	8				750	27

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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										
222MT1A6CA	Core - XV	Complex Analysis	4	-	-	3	50	50	100	4
222MT1A6CB	Core -XVI	Linear Algebra	4	1	-	3	50	50	100	4
222MT1A6EP	Core - XVII Practical	Fundamentals of Computing and Python Programming	3	-	4	3	50	50	100	5
222MT1A6SP	SEC - IV Practical	Linear Programming using Spreadsheet	-	-	4	3	50	50	100	2
222MT1A6DA	DSE-II	Cryptography	4	-	-	3	50	50	100	4
222MT1A6DB		Graph Theory								
222MT1A6DC		Mathematical Fundamentals in Pharmacokinetics								
222MT1A6DD	DSE-III	Combinatorics	4	-	-	3	50	50	100	4
222MT1A6DE		Automata Theory and Formal Languages								
222MT1A6DF		Mathematical models in Econometrics								
Part – IV										
223BC1A6AA	AECC-III	Innovation, IPR and Entrepreneurship	2				50		50	2
Total			21	1	8				650	25
***Grand Total**									4000	142

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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	222MT1A5DA	Fuzzy Logic
2	222MT1A5DB	Discrete Mathematics
3	222MT1A5DC	Mathematical Foundations in Cryptography

Semester VI (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	222MT1A6DA	Cryptography
2	222MT1A6DB	Graph Theory
3	222MT1A6DC	Mathematical Fundamentals in Pharmacokinetics

Semester VI (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1	222MT1A6DD	Combinatorics
2	222MT1A6DE	Automata Theory and Formal Languages
3	222MT1A6DF	Mathematical models in Econometrics

GENERIC ELECTIVE COURSE (GE)

The following are the course offered under Generic Elective Course

Semester V

S. No.	Course Code	Course Name
1	222MT1A5GA	Vedic Mathematics

EXTRA CREDIT COURSES

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

Semester III

S. No.	Course Code	Course Name
1	222MT1ASSA	History of Mathematics
2	222MT1ASSB	Introduction to Vedic Mathematics

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 45th working day)	15
2	Model (All 5 Units) (On completion of 85th 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	• Engagement in class • Listening Skills • Behaviour
2	Case Study Presentation/ Term Paper	• Identification of the problem • Case Analysis • Effective Solution using creativity/imagination
3	Field Study	• Selection of Topic • Demonstration of Topic • Analysis & Conclusion
4	Field Survey	• Chosen Problem • Design and quality of survey • Analysis of survey
5	Group Discussion	• Communication skills • Subject knowledge • Attitude and way of presentation • Confidence • Listening Skill

6	Presentation of Papers in Conferences	• Sponsored • International/National • Presentation • Report Submission
7	Industry Visit	• Chosen Domain • Quality of the work • Analysis of the Report • Presentation
8	Book Review	• Content • Interpretation and Inferences of the text • Supporting Details • Presentation
9	Journal Review	• Analytical Thinking • Interpretation and Inferences • Exploring the perception if chosen genre • Presentation
10	e-content Creation	• Logo/ Tagline • Purpose • Content (Writing, designing and posting in Social Media) • Presentation
11	Model Preparation	• Theme/ Topic • Depth of background Knowledge • Creativity • Presentation
12	Seminar	• 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, **atleast 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	

Class Advisor **HoD** **Dean**

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**
- **AEEC**

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 (AEEC)

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 & AEEC (Theory)

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

Distribution of Internal Marks for Generic Elective (AEEC) (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
	Total	**50**

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
Basic Tamil	**Advanced Tamil**
Section -A	**Section -A**
Choose the correct answer **10**x2=20	**Choose the correct answer** **10**x1=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 ½ 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 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	✓			✓	✓

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

221TL1A1TA	TAMIL- I: IKKALA ILAKKIYAM	SEMESTER I

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 - நாமக்கல் கவிஞர்
5. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
6. திரைத்தமிழ்

அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி' எனத் தொடங்கும் பாடல் - உடுமலை நாராயண கவி

ஆ) 'சும்மா கிடந்த நிலத்தை' எனத் தொடங்கும் பாடல் - பட்டுக்கோட்டை கல்யாண சுந்தரனார்

இ) 'சமரசம் உலாவும் இடமே' எனத் தொடங்கும் பாடல் - மருதகாசி

ஈ) 'உன்னை அறிந்தால்' எனத் தொடங்கும் 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,ன வேறுபாடு - ஒலிப்பு நெறி, சொற்பொருள் வேறுபாடு அறிதல்)

ஆ. படைப்பாக்கம்

1. கவிதை - எழுதுதல் (15 வரிகள் முதல் 30 வரிகள் வரை)

2.சிறுகதை - எழுதுதல் (குறைந்தது 3 பக்கங்கள்)

Text Book

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

References

1 பேராசிரியர் புலவர் சோம. இளவரசு, எட்டாம் பதிப்பு - 2014, தமிழ் இலக்கிய வரலாறு – மணிவாசகர் பதிப்பகம், சென்னை – 600 108.

2 பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு - 2013, இலக்கணம் - இலக்கிய வரலாறு - மொழித்திறன் - பூவேந்தன் பதிப்பகம், சென்னை-600 004.

3 இணையதள முகவரி: https://www.tamilvu.org

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

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

221TL1A1HA	HINDI– I: MODERN LITERATURE	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 13 h

गद्य - नूतन गद्य संग्रह (जय प्रकाश)पाठ 1- रजियापाठ 2- मक्रीलपाठ 3- बहता पानी निर्मला पाठ 4- राष्ट्रपिता महात्मा गाँधी

Unit II 13 h

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

Unit III 12 h

व्याकरण : शब्द विचार (संज्ञा, सर्वनाम,विशेषण)

Unit IV 12 h

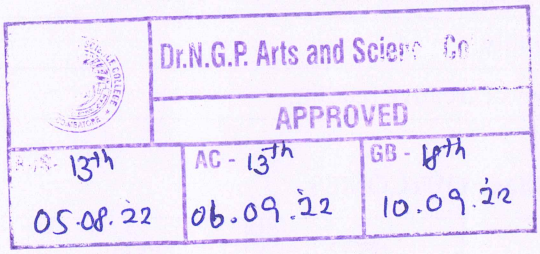
अनुच्छेद लेखन

Unit V 10 h

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

Text Books

1. प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्ट्मेंट्स, 15 हेस्टिंग्स रोड'अशोक नगर इलाहाबाद-211001
2. प्रकाशक: गोविन्द प्रकाशनसदर बाजार, मथुरा उत्तरप्रदेश-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 चेनैई -17



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	✓	✓	✓		✓

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

221TL1A1MA	MALAYALAM- I: MODERN LITERATURE	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Novel** 14 h

Pathummayude Adu

Unit II **Novel** 10 h

Pathummayude Adu

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, "Pathummayude Adu" (NOVEL), DC Books & Kottayam

2 T.Padmanabhan, "Nalinakanthi" (Short Story), DC Books & Kottayam.

References

1 Malayala Novel Sahithyam.

2 Malayala Cherukatha Innale Innu.

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	✓		✓		✓

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

221TL1A1FA	FRENCH- I: GRAMMAR, TRANSLATION AND CIVILIZATION	SEMESTER I

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
• Saluer • Enter en contact • avec quelqu'un. • Se presenter. • S'excuser	En cours de cuisine, premiers contacts avec les members d'un groupe	• Comprendre des personnes qui se saluent. • Ēchanger pour entrer en contact, se présenter, saluer, s'excuser. • Communiquer avec *tu* ou *vous*. • Comprendre les consignes de classe • Ēpeler son nom et son prénom. Computer jusqu'à 10.

Unit II Enchanté I Page 20 — 12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Demander de se presenter. • Présenter quelqu'un.	Dans la classe de français, se presenter et remplir une fiche pour le professeur.	• Comprendre les informations essentielles dans un échange en milieu professionnel. • Ēchanger pour se presenter et présenter quelqu'un.

Unit III J'adore I Page 30 — 12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Exprimer ses gouts.	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation.	• Dans une soirée de recontres rapid comprendre des personnes qui échangent sur elles et sur leurs goût • Comprendre une personne qui parler 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
• Présenter quelqu'un	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• 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 passes. 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) (Methode de Français), Goyal Publisher & Distributors Pvt.Ltd., 86 UB Jawahar Nagar (Kamala Nagar), Delhi-7 Les Editions Dider, Paris, 2008- Imprime en Roumanie par Canale en Janvier 2012.

221EL1A1EA	PROFESSIONAL ENGLISH- I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies 10 h

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

NiyiOsundare: 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
222MT1A1CA	CALCULUS WITH SCILAB	CORE	4	2	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the applications of maxima and minima of functions
- the method of constructing evolutes and envelopes corresponding to a curve
- the influence of various operators on vector functions and its applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	identify the maxima and minima of functions	K1
CO2	describe the curvature and evolutes of curves	K2
CO3	recognize the envelope of given surface	K2
CO4	employ various operators on vector functions	K3
CO5	illustrate the applications of vector integration	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

222MT1A1CA	CALCULUS WITH SCILAB	SEMESTER I

Total Credits: 4

Total Instruction Hours: 72 h

Syllabus

Unit I Maxima , Minima and Points of inflexion 14 h

Maximum and minimum value of a function- necessary conditions for extreme values - sufficient condition - use of second order derivative - application - criteria for concavity upwards - concavity downwards - inflexion at a given point - Computations using Scilab.

Unit II Curvature and Evolutes 14 h

Introduction - definitions - length of arc as a function derivative of arc - radius of curvature - Cartesian equations - Newtonian method - centre of curvature - properties of the evolutes - Computations using Scilab.

Unit III Singular Points and Envelopes 14 h

Introduction - cusps, nodes and conjugate points - definitions - tangents at the origin - conditions for any point (x, y) to be a multiple point - types of cusps - Radii of curvature at multiple points - Envelopes : one parameter family of the curves - determination of envelope – theorem - Computations using Scilab.

Unit IV Divergence and Curl 15 h

Divergence and Curl - Illustrations of curl f and div f - Gradient, Divergence and curl of sums - gradient, divergence and curl of products - second order Differential operator - Laplacian operator- Differential operators in terms of curvilinear co ordinates - differential of length - Computations using Scilab.

Unit V Vector Calculus 15 h

Line integrals - circulation, irrotational vector point functions - surface integrals - flux across a surface: solenoidal vector point functions - volume integrals - reduction of volume to surface integrals - physical interpretation of Gauss' theorem - Computations using Scilab.

Text Books

1 Shanti Narayan, 2003, "Differential Calculus", S Chand and Company Limited, New Delhi

2 Shanti Narayan, Mittal, P.K, 2020, "A text book of Vector Analysis", S Chand and Company Limited, New Delhi

3 Er. Hema Ramachandran and Achuthsankar S Nair (For SciLab experiments), 2015, First edition, "Scilab (A free Software to Matlab)", S. Chand and Company Limited, New Delhi

References

1 S. Narayanan and T.K.M. Pillai, 2008 "Calculus", Vol 1, Viswanathan Publishers, Chennai

2 S. Narayanan and T.K.M. Pillai, 2008 "Calculus", Vol 2, Viswanathan Publishers, Chennai

3 Kanti Kumar Verma and Deepak Kumar , 2015, "The elements of vector calculus, AITBS Publishers, New Delhi

4 For Scilab, https://help.scilab.org/docs/6.0.0/en_US/section_647d3aa8a35d1f0c755bed6b756f36c0.html

Course Code	Course Name	Category	L	T	P	Credit
222MT1A1CB	ANALYTICAL GEOMETRY WITH GEOGEBRA	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the relation between plane and straight line
- the influence of planes in the construction of various forms of a sphere
- the properties of the conicoids

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the equation of plane under given conditions	K1
CO2	identify the shortest distance between two lines and validate the co-planarity of lines	K1
CO3	explain the relation between a sphere and a plane	K2
CO4	recognize the equations of right circular cone and cylinder	K2
CO5	illustrate the geometrical concepts behind conicoid	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

222MT1A1CB	ANALYTICAL GEOMETRY WITH GEOGEBRA	SEMESTER I

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I The Plane 12 h

Different forms – a point in relation to a plane – a plane in relation to another plane – bisector of two intersecting planes – locus of a plane - executing simple geometric problems using GEOGEBRA

Unit II The Straight Line 13 h

Different forms – co-planarity of straight lines – distance of a point from a straight line – shortest distance between two straight lines – intersection of three planes - executing simple geometric problems using GEOGEBRA

Unit III The Sphere 11 h

Different forms of a sphere – Points, lines, planes and spheres in relation to a sphere – system of spheres – tangent planes and normal - executing simple geometric problems using GEOGEBRA

Unit IV Conicoids 12 h

The cone – cylinder – ellipsoid – hyperboloid – paraboloid – Surfaces of revolutions - executing simple geometric problems using GEOGEBRA

Unit V Ruled Surfaces 12 h

Tangents and normals – ruled surfaces, generators – diameters, diametral planes and conjugate diameters – sections of conicoids, Umbilics - executing simple geometric problems using GEOGEBRA

Text Books

1 Dipak Chatterjee, 2003, "Analytic Solid Geometry", Prentice Hall of India Private Limited, New Delhi.

References

1 Dipak Chatterjee, 2003, "Analytic Solid Geometry", Prentice Hall of India Private Limited, New Delhi.

2 Abraham Albert, 2016, "Solid Analytic Geometry", Dover Publications, New York.

3 Durai Pandian, Laxmi Durai Pandian and Mukilan, 2003, "Analytical Geometry 3D", S.Chand and company Pvt. Ltd., New Delhi.

4 Geogebra Manual – The Offical Manual of Geogebera Research.shu.ac.uk/geogebra/GIF – Guides/official Geogebra manual.pdf(2011).

5 Manicavachagom Pillay T.K. and Natarajan T. 2011, Analytical Geometry (Three Dimensions), S. Viswanathan Publishers, Chennai..

Course Code	Course Name	Category	L	T	P	Credit
222PY1A1IP	MODERN PHYSICS	IDC	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- the properties of electricity, crystals and electronics
- the mode of spectral lines formation in optics
- the basics of digital electronics

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the applications of electrical circuits	K2
CO2	Classify different types of bonds, bond theory and energy gaps	K2
CO3	Develop the different kinds of spectral formation	K3
CO4	Demonstrate the working of diodes and rectifiers	K2
CO5	Experiment with the logic gates	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

222PY1A1IP	MODERN PHYSICS	SEMESTER I

Total Credits: 5

Total Instruction Hours: 72 h

Syllabus

Unit I Electricity 16 h

Capacitors – Types of capacitors - Spherical capacitor - Cylindrical capacitor - Carey-Foster's bridge – Working of potentiometer - Calibration of voltmeter - Calibration of ammeter

1 Calibration of low range voltmeter using potentiometer

2 Determination of unknown resistance using Carey Foster's bridge

3 Calibration of low range ammeter using potentiometer

Unit II Crystals 13 h

Ionic crystals - Covalent crystals - Metallic bond - Band theory of solids - Tunnel diodes - Energy bands - Superconductivity - Bound electron pairs - Hall effect - Experimental determination of hall coefficient.

4 Determination of band gap of semiconductors using four probe method

5 Determination of band gap of semiconductor by thermal method

Unit III Optics 17 h

Interference in the thin film - Air wedge – Thickness of a thin wire – Newton's rings – Determination of wavelength using Newton's rings - Theory of transmission grating – Normal incidence.

6 Determination of wavelength of mercury lines by grating minimum deviation method

7 Determination of the radius of curvature in Newton's rings

Unit IV Analog Electronics 13 h

Bridge rectifiers – Band gap determination using post office box –Transistor characteristics in common base and common emitter mode - Transistor single stage amplifier- Expression for input impedance - Output impedance and current gain

8 Characterization of junction diode

9 To determine band gap using Post office box method

Unit V Digital Electronics 13 h

1's and 2's complement of a binary number and binary arithmetic - Steps in the fabrication of Monolithic IC's – General applications of IC's - Registers - Flip flops - JK flip flops - Half adder - Full adder.

10 Verification of logic gate truth table

11 Verification of De Morgan's law

12 Construction and working of IC regulated power supply

Text Books

1 Murugesan R., 2016, "Modern Physics", 18th Edition, S.Chand and Co, New Delhi.

2 [E-book]Arthur B, 2003, "Concepts of Modern Physics", 6th Edition, McGraw-Hill, New York.

References

1 Sedha R.S., 2004, "A text book of Digital Electronics", 1st Edition. S. Chand & Co, New Delhi

2 David H, Robert R, Jearl W, 2014, "Fundamentals of Physics", 10th Edition. John Willy Company Hoboken, New Jersey, United States

3 [E-book] Serway A.R., Jewett W.J., 2014, "Physics for Scientists and Engineers with Modern Physics",9th Edition,Brooks/Cole, USA

4 Brijal N and Subramanian, "Text book of optics", S. Chand & Company, New Delhi.

5 Weblink: https://www.askiitians.com/revision-notes/physics/solid-and-electronic-device/

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					✓

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

223MB1A1AA	ENVIRONMENTAL STUDIES	SEMESTER I

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.

BoS Chairman/HoD
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Dr.N.G.P. Arts and Science Col...
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13th	AC - 13th	GB - 18th
05.08.22	06.09.22	10.09.22

Academic Council
Dr.V. Rajendran
CHAIRMAN
Dr.N.G.P. Arts and Science College

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 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

221TL1A2TA	TAMIL- II:ARA ILAKKIYAM	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **அற இலக்கியம்** 13 h

1. இலக்கிய வரலாறு- பதிணென்கீழ்க்கணக்குநூல்கள்

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. மூதுரை - ஔவையார் - 10 பாடல்கள்- 6,7,9,10,14,16,17,23,26,30

3. இனியவைநாற்பது- 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-பொதுத்தலைப்பில் 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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BoS-14th 19.11.2022	AC - 14th 19.01.'23	GB - 19th 30.01.'23

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	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

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

221TL1A2HA	HINDI – II: MODERN LITERATURE	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 13 h

आधुनिकपद्य – शबरी(श्रीनरेशमेहता)

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 अपार्ट्मेंट्स, 15 हेस्टिंग्स रोड'अशोक नगर इलाहाबाद. (Unit II)
3. प्रकाशक: राधाकृष्ण प्रकाशन दिल्ली. (Unit III)
4. पुस्तक: व्याकरण प्रदिप – रामदेवप्रकाशक: हिन्दी भवन 36 इलाहाबाद. (Unit IV)
5. प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई. (Unit V)

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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	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

✓	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

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Novel** 12 h

Enmakaje: Chapter 1- Chapter5

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

NeermathalamPoothaKalam: Chapter 1 - Chapter 10

Unit V **Autobiography** 12 h

NeermathalamPootha Kalam: Chapter 11 - Chapter 20

Text Books

1. Ambika SuthanMangad, Enmakaje (Novel), DC Books Kottayam, Kerala, India. (Unit I to III)
2. Madhavikkutty, NeermathalamPootha Kalam (Autobiography), DC Books Kottayam, Kerala, India. (Unit IV & V)

References

1. MalayalaNovel Sahithyam, DC Books Kottayam, Kerala, India.
2. MalayalaSahithyaCharithram, 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	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

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

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

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 12 h

Proposer, accepter, refuserune invitation. Indiquer la date.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendreunemessage d'invitationsurunréponde urtéléphonique. Inviter quelqu'un accepter ourefuserl'invitation.

Unit II 12 h

Prendreet fixer un rendez-vous. Demander etindiquerl'heure.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendre des personnes qui fixentunrendez-vous par téléphonique. Prendreun rendez-vous par telephone

Unit III 12 h

Exprimer son point de vue positif et négatif. S'informersur le prix. S'informersur la quantitité. Exprimer la quantitité.	En groupes, choisir un cadeau pour un ami.	Exprimer son point de vuesur des idées de cadeau. Faire des achatsdans un magasin

Unit IV 14h

Demander etindiquerune direction. Localiser (près de, en face de ….). Exprimerl'obligationl' Interdit.Conseiller.	Suivre un itinéraire à l'aided'indications par telephone et d'un plan. Par courrierélectronique, donner des informations et des conseils à un ami qui veut voyager.	Comprendre des indications de direction. Comprendre des indications de lieu. Comprendreune chanson. Comprendre de courts messages qui experiment l'obligationoul'interdictio n. Donner des conseils à des personnesdans des situations données.

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 toIV)

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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	Relate and appreciate the eminent writers works of various genres	K1
CO2	Infer and comprehend complex situational talks	K2
CO3	Identify formal and informal communicative context to speak fluently	K3
CO4	Construct the denotative and connotative meanings while reading specialized texts	K3
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

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.

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Course Code	Course Name	Category	L	T	P	Credit
222MT1A2CA	DIFFERENTIAL EQUATIONS	CORE	4	2	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the method of solving linear differential equations with constant coefficients
- the application of differential equations
- the solvability of linear and non-linear partial differential equations of order one

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	find the Particular integral of linear differential equations	K2
CO2	solve second order differential equations	K3
CO3	apply the differential equations in physical problems	K4
CO4	solve linear partial differential equations of order one	K2
CO5	solve non-linear partial differential equations of order one	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

222MT1A2CA	DIFFERENTIAL EQUATIONS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 72 h

Syllabus

Unit I Linear differential equations with constant coefficients 16 h

Linear differential equations with constant coefficients- determination of complementary function- working rule- symbolic function 1/f(D)- general method of getting P.I- working rule for finding P.I- methods of finding P.I- X=e^{ax}, sin ax, cos ax, x^m, $e^{ax}.V$, xV.

Unit II Linear differential equations of second order 12 h

General form-complete solution of y''+Py'+Qy=R - rule for getting an integral belonging to C.F - working rule - reduction to normal form- transformation of the equation by changing the independent variable- method of variation of parameters- solutions by operators.

Unit III Applications of differential equations 14 h

Introduction- mixture problems - Newton's second law and Hooke's law- differential equation of the vibrations of a mass on a spring- Free, undamped motion- Free, damped motion- forced motion- resonance phenomena- electric circuit problems - Applications to mechanics.

Unit IV Linear partial differential equations of order one 14 h

Origin of PDE - derivation of PDE by the elimination of arbitrary constant and function - Cauchy problem - Lagrange's equation- Lagrange's method of solving Pp+Qq=R - Type 1 based on rule I- type 2 based on rule II- type 3 based on rule III- type 4 based on rule IV- miscellaneous examples.

Unit V Non-linear partial differential equations of order one 16 h

Complete integral- particular integral- singular and general integral- geometrical interpretation- method of getting singular integral- compatible system of first order equations- Charpit's method- methods of solutions to certain standard forms- standard forms I, II, III and IV.

Text Books

1 Raisinghania M. D, 2012, "Ordinary and Partial Differential Equations", Fourteenth Edition, S. Chand & Company Limited, New Delhi.

References

1 Narayanan S and Manicavachagam Pillay T.K, 2014, "Differential Equations and its Applications", S. Viswanathan Printers and Publishers Pvt Ltd, Chennai.

2 Bali N.P, 2004, "Differential Equations", Laxmi Publications Limited, New Delhi.

3 Zafar Ahsan, 2016, "Differential Equations and their Applications", PHI Learning Private Limited, New Delhi.

4 Kandasamy P and Thilagavathi K, 2004, "Mathematics for B.Sc. Branch-I" Volume III, S. Chand and Company Ltd, New Delhi.

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Course Code	Course Name	Category	L	T	P	Credit
222MT1A2CB	FOURIER SERIES AND INTEGRAL TRANSFORMS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the behavior of Fourier series
- the different types of integral transforms
- the method of solving boundary value problem using Integral transforms

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the given function in the form of Fourier series	K2
CO2	identify the Fourier transform of a function	K1
CO3	illustrate the application of Inverse Fourier transform	K3
CO4	explain the properties of Laplace transform	K2
CO5	apply the concept of Inverse Laplace transform to solve differential equations	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

222MT1A2CB	FOURIER SERIES AND INTEGRAL TRANSFORMS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Fourier series 13 h

The Fourier coefficients-the problem of convergence-even and odd functions. Cosine and sine series-extension to arbitrary intervals.

Unit II Fourier Transform 12 h

Fourier transforms- Fourier sine and cosine transforms- linearity property - change of scale property- Modulation theorem- evaluation by inversion theorems- Fourier transform of some particular functions- convolution of functions- convolution theorem - Parseval's relations.

Unit III Applications of Fourier Transform 10 h

Fourier transforms of rational functions- examples - solution of integral equations of convolution type- Fourier transform of functions of several variables- application of Fourier transform to boundary value problems.

Unit IV Laplace Transform 12 h

Definitions- Sufficient conditions - linearity property - Laplace transforms of some elementary functions- first and second shift theorem- change of scale property- examples- Laplace transform of derivatives and integrals- Laplace transform of t^n f(t), f(t)/t , periodic function and special functions- initial and final value theorems- examples - convolution.

Unit V Inverse Laplace Transform and applications 13 h

Introduction- calculation of Laplace inversion of some elementary functions- method of partial fractions of the ratio of two polynomials -general evaluation technique of inverse Laplace transform- application of Laplace transform.

Text Books

1 George F.Simmons, 2019, "Differential Equations with Applications and Historical Notes", Mc Graw Hill Education (India) Pvt. Ltd., New Delhi.

2 Baidyanath Patra, 2018, "An Introduction to Integral Transforms", first edition, CRC Press,London.

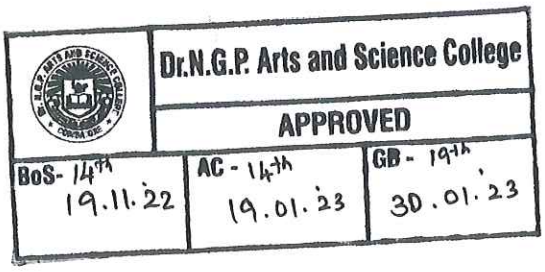
References

1 Lokenath Debnath and Dambaru Bhatta, 2014," Integral Transforms and their applications", third edition, CRC Press, London.

2 Parmanand Gupta, 2019, "Topics in Laplace and Fourier Transforms", First edition, Laxmi Publications Pvt. Ltd., New Delhi.

3 Veerarajan T, 2022," Fourier Series and Integral Transforms ", Yes Dee Publishing Pvt. Ltd., Chennai.

4 Ray Hanna J and John H.Rowland, 1990, "Fourier Seires, Transforms and Boundary Value Problems", Second edition, John wiley & Sons, Inc, New York.



Course Code	Course Name	Category	L	T	P	Credit
222PY1A2IP	APPLIED PHYSICS	IDC	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- The basic principles, theory and concepts of properties of matter.
- The concepts of viscosity and surface tension.
- The basic programming in microprocessor.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the importance and applications of young's modulus.	K2
CO2	Utilize the concepts of viscosity for given liquid.	K2
CO3	Explain the concept of surface tension and modes of vibration.	K3
CO4	Illustrate the gravitational field and related applications.	K2
CO5	Develop the microprocessor architecture of 8085.	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

222PY1A2IP	APPLIED PHYSICS	SEMESTER II

Total Credits: 5

Total Instruction Hours: 72 h

Syllabus

Unit I Properties of Matter **16 h**

Young's Modulus – Rigidity Modulus – Poisson's Ratio – Bending of Beams – Expression for Bending Moment – Measurement of Young's Modulus – Uniform and Non-Uniform Bending.

1 Determine the Young's modulus of a given bar – Uniform bending (Microscopic method).

2 Determine the Young's modulus of given bar - Non Uniform bending (Microscopic method).

3 Determination of rigidity modulus of a string by using static method.

Unit II Viscosity **13 h**

Poiseuille's formula for the flow of a liquid through capillary tube – Ostwald's viscometer – Stokes method for coefficient of viscosity of a viscous liquid – Friction and lubrication.

4 Determine the coefficient of viscosity of water by Poiseuille's Method.

5 Determine the coefficient of viscosity of water by Stoke's Method.

Unit III Surface Tension and Vibration **17 h**

Explanation of surface tension on kinetic theory – Work done in increasing area of a surface – Pressure difference across a liquid surface - Jaegar's method - Transverse and longitudinal modes of vibration - A.C. frequency measurement using sonometer.

6 Determine the surface tension of water by drop weight method.

7 Study the frequency of a tuning fork by sonometer.

Unit IV Gravitation **13 h**

Newton's law of gravitation - Kepler's laws of planetary motion - Determination of 'G' Boy's experiment - Variation of g with altitude & depth - Determination of g with compound pendulum.

8 Compound Pendulum - Determination of 'g'.

9 Torsional pendulum - Determination of moment of inertia of given disc.

Unit V Microprocessors 8085 instruction set 13 h

8085 Machine language - 8085 assembly language - ASCII codes - writing and executing an assembly language program - High level language - Operating system.

10 Write the assembly language program for 8-bit subtraction.

11 Write the assembly language program for 8-bit addition.

12 Write the assembly language program for 8 bit Multiplication.

Note: Any 10 Experiments

Text Books

1 Murugesan R., 2016, "Modern Physics", 18th Edition, S. Chand and Co, New Delhi.

2 Ramesh S. Gaonkar, 2013, "Microprocessor architecture, Programming and application with 8085", 6th edition, New age international, New Delhi.

References

1 Brij Lal and Subrahmanyam N, 2017,"Properties of Matter", 7th Edition, S. Chand and Co, New Delhi.

2 Subramanyam N, 2019,"Text book of Sound", 3rd Edition, Vikas publications, New Delhi.

3 Nagoor Kani A, 2012, "Microprocessors and Microcontrollers", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi

4 E-book: Godse A.P, Godse D.A, 2008, "Microprocessors and Microcontroller System" Technical Publications, Pune.

5 Weblink: https://https://archive.nptel.ac.in/courses/108/105/108105102/

221TL1A2AA	PART-IV : BASIC TAMIL	SEMESTER II

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 **மொத்த மதிப்பெண்கள் - 50**

பகுதி – அ

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 அடிப்படைத் தமிழ் - 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை 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
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Dr.N.G.P. Arts and Science College		
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BoS- 14th 19.11.2022	AC - 14th 19.01.'23	GB - 14th 30.01.'23

221TL1A2AB	PART - IV : ADVANCED TAMIL	SEMESTER II

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

1தமிழ்நாடு - 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. வலைதள முகவரி : https://www.tamilvu.org

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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

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

225CR1A2AA	HUMAN RIGHTS AND WOMEN'S RIGHTS	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Human Rights 04 h

Human Rights: 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 Women & Law, 2009, "Krishna Pal Malik", 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 Venkataramand 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.

BoS Chairman/HoD
Department of Mathematics
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

Dr.N.G.P. Arts and Science College
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BoS - 14th	AC - 14th	GB - 19th
19.11.22	19.01.23	30.01.23

Academic Council
Dr.V. Rajendran
CHAIRMAN
Dr.N.G.P. Arts and Science College

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

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

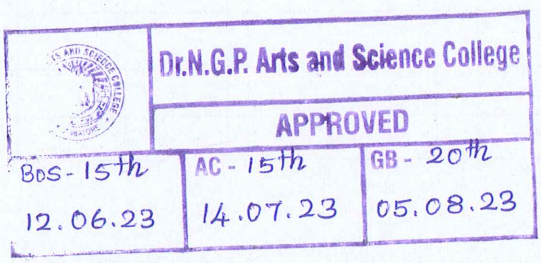
1 தமிழ் மொழிப்பாடம் - 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என். ஜி. பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. (Unit I to V)

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

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

221TL1A3HA	HINDI – III	SEMESTER III

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 चेनैई -17 (Unit V)

Dr.N.G.P. Arts and Science College
APPROVED
BoS- 15th 12.06.23 | AC - 15th 14.07.23 | GB - 20th 05.08.23

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 FOCUSES 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

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.

Dr.N.G.P. Arts and Science College

APPROVED

BOS - 15th	AC - 15th	GB - 20th
12.06.23	14.07.23	05.08.23

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

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

221TL1A3FA	FRENCH - III	SEMESTER III

Total Credits: 3
Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

° Décrireun lieu. ° Situer	A partird'unerecherche de documents, composer une presentation touristique pour un magazine ou un site internet.	Comprehendre la description d'un lieu. Décrireunevilleouunerégionq u'onaime. Interrogersur la situation of d'un lieu. Comprendre des indications sur la fréquenced'actions.	Comprendreune presentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation precise dans un message électronique.

Unit II 10 h

Se situerdans le temps.	A partird'unerecherc he de documents, composer une presentation touristique pour un magazine ou un site internet.	Comprehendre la description d'un lieu. Décrireunevilleouunerégio nqu'onaime. Interrogersur la situation of d'un lieu. Comprendre des indications sur la fréquenced'actions.	Comprendreune presentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation precise dans un message électronique.

Unit III 10 h

Raconter. ° Décrire les étapesd'une action.	Raconterune scene insolite à l'oreal et à l'écrit.	Comprehendre le récit d ún voyage. Raconterses actions quotidiennes.	Ecrire une biographie a partir d'eléments écrits.

Unit IV 10 h

Exprimer l'intensité et la quantité. ° Interroger.	Raconterune scene insoliteà l'oreal et à l'écrit.	Comprehendre le récit d ún voyage. Raconterses actions quotidiennes.	Ecrire une biographie a partir d'eléments écrits.

Unit V 08 h

Make in Own Sentences based on the above Lessons

Text Book

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

Dr.N.G.P. Arts and Science College
APPROVED

BoS - 15th	AC - 15th	GB - 29th
12.06.23	14.07.23	05.08.23

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

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 Mchrawttill 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
222MT1A3CA	MECHANICS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concept and impact of forces on various terms of bodies
- the method of finding mass centre using integration
- the applications of simple harmonic motion and projectiles

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the impact of forces on a particle	K2
CO2	discuss the influence of coplanar forces on a rigid body	K2
CO3	explain the concept of centre of mass	K2
CO4	apply the principle of virtual work concepts in real life problems	K3
CO5	analyze the concept of simple harmonic motion	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

222MT1A3CA	MECHANICS	SEMESTER III

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Force & Equilibrium 10 h

Newton's laws of motion-resultant of two forces on a particle-equilibrium of a particle-limiting equilibrium of a particle on an inclined plane.

Unit II Forces on a Rigid body 13 h

Moment of a force - general motion - equivalent systems of forces - parallel forces - forces along the sides of a triangle – couples - resultant of several coplanar forces - line of action of the resultant-equilibrium of a rigid body under three coplanar forces.

Unit III Reduction of forces and centre of mass 12 h

Reduction of coplanar forces into a force and a couple-problems involving frictional forces-centre of mass- finding mass centre- hanging body in equilibrium.

Unit IV Stability, Virtual work and Hanging strings 12 h

Stability of equilibrium-stability using differentiation-virtual work-equilibrium of a uniform homogeneous string-suspension bridge.

Unit V Rectilinear motion under varying forces & Projectiles 13 h

Simple harmonic motion - S.H.M. along a horizontal line and vertical line - motion under gravity in a resisting medium - forces on a projectile - projectile projected on an inclined plane - enveloping parabola.

Text Books

1 Duraipandian P, Laxmi Duraipandian, Muthamizh Jayapragasam,2014, "Mechanics ", S. Chand & Company Pvt. Ltd, New Delhi

References

1 Naveen Kumar, 2010, "Mechanics", Narosa Publishing House, New Delhi

2 Venkataraman M.K. ,2012,"Statics", Agasthiar Publications, Trichy

3 Venkataraman M.K.,2012,"Dynamics", Agasthiar Publications, Trichy.

4 Raisinghania M.D, 2006, "Dynamics", Sultan Chand and Sons, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A3CB	PROBABILITY THEORY	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the method of defining random variables
- applications of expectation and variance
- measure the relationship between two random variables

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	define the basic concepts of probability theory	K2
CO2	describe random variables and its corresponding functional forms	K3
CO3	compute Mathematical expectation and variance for analyzing the relation between variables	K4
CO4	illustrate generating functions corresponding to random variables with theorems	K3
CO5	employ the concept of correlation and regression analysis	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

222MT1A3CB	PROBABILITY THEORY	SEMESTER III

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Probability 13 h

Basic terminology- mathematical probability- statistical probability- subjective probability- mathematical tools-theorems on probability- conditional probability - multiplication theorem of probability-independent events.

Problems related to analyze the impact of diseases: cancer-obstetrics-pulmonary disease-hypertension- genetics.

Unit II Random variables 12 h

Discrete and continuous random variables - distribution function- two-dimensional random variable - joint probability mass function-marginal and conditional probability distributions - independence of random variables.

Representation of random variables in the field of Ophthalmology - Otolaryngology- Hypertension related problems.

Unit III Mathematical Expectation 11 h

Expected value - expected function - properties – covariance -inequalities involving expectation - moments of bivariate probability distributions - conditional expectation and conditional variance.

Computation of average level of risk arising in Hypertension and Otolaryngology

Unit IV Generating Functions 11 h

Moment generating functions - cumulants - characteristic functions - theorems - Chebychev's inequality - weak law of large numbers.

Unit V Correlation & linear regression 13 h

Correlation – scatter diagram – Karl Pearson's coefficient of correlation – calculation of the correlation coefficient for a bivariate frequency distribution – probable error on correlation coefficient - rank correlation - linear regression.

Correlating the impact of risk factors in Hypertension – Obstetrics – Pediatrics - Cardiovascular Disease - Pulmonary Function

Text Books

1 Gupta S.C and Kapoor V.K, 2022, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi.

2 Bernard Rosner, 2015, " Fundamentals of Biostatistics", United States of America Print, Harvard University USA.

References

1 Gupta C B and Vijay Gupta, 2007,"Introduction to Statistical Methods", S.Chand&Co, New Delhi.

2 Sanchetti D.C and Kapoor V.K, 2010, "Statistic", S. Chand & Co, New Delhi.

3 Veerarajan T, 2017,"Fundamentals of Mathematical Statistics", Yes Dee Publishing Pvt. Ltd, Chennai.

4 Paul G. Hoel, 2018, "Introduction to Mathematical Statistics", John Wiley India Ltd, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A3CC	NUMERICAL METHODS	CORE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the effectiveness of numerical solution over analytical solution
- error analysis of a method to examine its accuracy
- the method of solving various real time problems

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	demonstrate the solution of linear systems by Gauss Elimination and Seidal methods	K2
CO2	develop skills in analyzing the methods of interpolating a given data	K4
CO3	analyze and estimate the accuracy of numerical methods	K4
CO4	apply the numerical methods to find the solution of ordinary differential equations	K3
CO5	examine the solution of partial differential equations by using numerical methods	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

222MT1A3CC	NUMERICAL METHODS	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Solution of Algebraic equation and Linear System 10 h

Newton-Raphson method - Direct Methods: Gaussian Elimination method- Gauss Jordan method - modification of Gauss Method to compute the inverse - LU decomposition method - solution of Tridiagonal systems.

Unit II Interpolation 10 h

Errors in polynomial interpolation - finite differences - detection of errors - differences of a polynomial - Newton's formulae - Gauss's central difference formulae - Stirling's formula - Lagrange's interpolation formula - errors - Hermite's interpolation Formula.

Unit III Numerical Differentiation and Integration 9 h

Numerical Differentiation - Maximum and minimum values of a tabulated function - numerical Integration - Trapezoidal rule - Simpson's 1/3 rule - Simpson's 3/8 rule - Boole's and Weddle's rules

Unit IV Numerical Solution of Ordinary Differential Equations 9 h

Solution by Taylor's series - Picard's method of successive approximations - Euler's method - Runge-Kutta methods - Predictor-Corrector methods

Unit V Numerical solution of Partial Differential Equations 10 h

Finite Difference approximations to derivatives - Laplace's equation - Jacobi's method - Gauss-Seidel method

Text Books

1 Sastry S.S., 2012, "Introductory methods of Numerical Analysis", Fifth Edition, Prentice-Hall of India, New Delhi

References

1 Venkataraman M K., 1999,"Numerical Methods in Science and Engineering", Fifth Edition, National Publishing Company, Chennai

2 Grewal B.S., 2010, "Numerical Methods in Engineering & Science: with Programs in C and C++", Tenth Edition, Khanna Publishers, New Delhi

3 Jain M.K., Iyengar, S.R.K. and Jain, R.K., 2012, "Numerical methods for Scientific and Engineering Computation", New Age International, New Delhi.

4 Curtis F Gerald, Patrick O. Wheatley, 2007, "Applied Numerical Analysis", Seventh Edition, Pearson Education India Ltd., New Delhi

Course Code	Course Name	Category	L	T	P	Credit
225CI1A3IA	BUSINESS ACCOUNTING	IDC	3	1		3

PREAMBLE

This course has been designed for students to learn and understand

- To analyze business transactions from an accounting viewpoint.
- To recognize, record, and classify new accounting data
- To understand the cost accounting concepts

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the accounting cycle, write simple journal entries and compute a trial balance	K1
CO2	Obtain knowledge to prepare final accounts of a company and to gain skills to detect and prevent errors in journal and ledger accounts	K2
CO3	Capture the procedures relating to bills of exchange, Account current and Average due date	K2
CO4	Understand accounting treatment for consignment and Joint venture	K3
CO5	Perform cost volume profit analysis and identify relevant costs.	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

225CI1A3IA	BUSINESS ACCOUNTING	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamentals of Book Keeping 10 h

Definition, objectives, methods of accounting, Branches of accounting, Types of Accounts and Accounting rules – Accounting Concepts and Conventions – Journal – Ledger – Subsidiary books: Purchases Book, Sales Book, Purchases Returns, Sales Return book, Cash Book (Single Column, Double Column and Triple Column) - Trial balance.

Unit II Final Accounts 9 h

Final accounts of a sole trader with adjustments: Trading Account, Profit and loss account, Balance Sheet, Adjustments

Unit III Bill of exchange 10 h

Definition of bill of exchange, essentials of Bill of exchange, classification of bill of exchange, Accounting Treatment Of Bill Of Exchange (bill retained, bill discounted with bank, bill endorsed, bill sent for collection, renewal of bill, Accommodation bills)

Unit IV Consignments and Joint venture 10 h

Consignment meaning, definition, features, account sales, valuation of unsold stock, goods sent on consignment at cost price and invoice price, various commission to consignee (only Problem). Joint venture: Meaning, features, distinction between joint venture and partnership, joint venture and consignment, accounting treatment for joint venture: when keeping separate sets of books is kept and without keeping separate set of books (Only Theory).

Unit V Basics of Cost Accounting 9 h

Meaning - definition – Difference between cost accounting and financial accounting- Advantages and disadvantages- Element of cost - preparation cost sheet – stock levels-EOQ-Methods of pricing of stock issue-FIFO-LIFO Simple average method – weighted average method.

Note: The question paper shall cover 20% theory and 80% problem

Text Books

1 Gupta R.L., Radhaswamy M., 2014, Financial Accounting , S.Chand & Company Ltd., New Delhi

2 Jain S P and Narang K L, 2019, Cost accounting, Kalyani publishers, New Delhi

References

1 Gupta R.L., Gupta V.K. and Shukla M.C., 2006, Financial Accounting, Sultan Chand & Sons, New Delhi.

2 Maheswari S.K., and Reddy T.S., 2005, Advanced Accountancy, Vikas Publishers, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A3SA	OPTIMIZATION TECHNIQUES	SEC	2	2	-	2

PREAMBLE

This course has been designed for students to learn and understand

- the optimal use of available resources
- the concept of simplex and duality in linear programming
- the time cost relationship and resource allocation

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	define the problem in the form of linear programming problem	K1
CO2	Formulate duality in linear programming problem	K2
CO3	compute the optimum solution for any form of transportation problem	K3
CO4	illustrate allocation of available resources to equal number of activities so as to minimize cost	K3
CO5	analyze the PERT and CPM network techniques	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

222MT1A3SA	OPTIMIZATION TECHNIQUES	SEMESTER III

Total Credits: 2

Total Instruction Hours: 48 h

Syllabus

Unit I Linear Programming Problem 9 h

Basic assumptions - advantages - application areas - formulating a problem as an LP model - examples - graphic method - some special cases.

Unit II Simplex method and Duality 10 h

Basic terms - computational aspect - special situations - formulation of dual LPP - construction of dual from primal - advantages - Interpreting Primal dual optimal solutions

Unit III Transportation Problem 10 h

Formulation - LP formulation – solution procedure – methods for finding initial solution - test for optimality - variations - maximization – sensitivity analysis.

Unit IV Assignment Problem 9 h

Mathematical model of assignment problem - solution methods – assignment algorithm - special variations

Unit V Project Network Analysis 10 h

Development of network analysis concept - developing the project network - critical path analysis - critical path method – programme evaluation and review technique - analysis of time-cost relationship - resource allocation.

Text Books

1 Kapoor V.K., 2022, "Operations Research - Quantitative Techniques for Management", Ninth edition, Sultan Chand & Sons, New Delhi

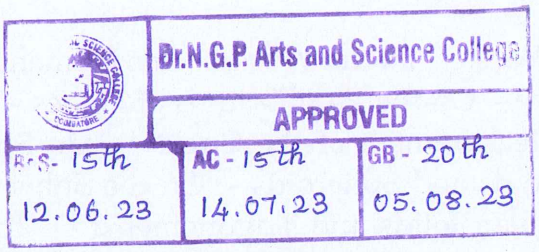
References

1 Kandi Swarup, Gupta P.K, Man Mohan, 2018, "Operations Research", 19th Edition, Sultan Chand & Sons, New Delhi

2 Panneerselvam R., 2009, "Operations Research", 2nd Edition, PHI Learning Private Limited, New Delhi

3 Taha, H.A., 2006, "Operations Research: An Introduction", 5th Edition, Prentice Hall of India Private Limited, New Delhi

4 Man Mohan, Gupta. P.K, 2004, "Problems in Operations Research", 14th Edition, Sultan Chand & Sons, New Delhi



222MT1ASSA	SELF STUDY: HISTORY OF MATHEMATICS	SEMESTER III

Total Credits: 1

Syllabus

Unit I Traces

Concepts and Relationships - Early Number Bases – Number Language and Counting - Spatial Relationships. Ancient Egypt: The Era and the Sources - Numbers and Fractions - Arithmetic Operations - "Heap" Problems - Geometric Problems - Slope Problems – Arithmetic Pragmatism. Mesopotamia: The Era and the Sources - Cuneiform Writing - Numbers and Fractions: Sexagesimals – Positional Numeration - Sexagesimal Fractions – Approximations – Tables – Equations - Measurements: Pythagorean Triads - Polygonal Areas - Geometry as Applied Arithmetic. Hellenic Traditions: The Era and the Sources - Thales and Pythagoras - Numeration - Arithmetic and Logistic - Fifth Century Athens -Three Classical Problems.

Unit II Euclid of Alexandria

Alexandria - Lost Works - Extant Works - The Elements. Archimedes of Syracuse: The Siege of Syracuse - On the Equilibriums of Planes - On Floating Bodies - The Sand-Reckoner - Measurement of the Circle - On Spirals - Quadrature of the Parabola - On Conoids and Spheroids - On the Sphere and Cylinder - Book of Lemmas - Semiregular Solids and Trigonometry - The Method. Apollonius of Perge: Works and Tradition - Lost Works - Cycles and Epicycles - The Conics.

Unit III Crosscurrents

Changing Trends - Eratosthenes - Angles and Chords - Ptolemy"s Almagest - Heron of Alexandria - The Decline of Greek Mathematics - Nicomachus of Gerasa - Diophantus of Alexandria - Pappus of Alexandria - The End of Alexandrian Dominance - Proclus of Alexandria Boethius - Athenian Fragments - Byzantine Mathematicians. Ancient and Medieval China: The Oldest Known Texts - The Nine Chapters - Rod Numerals - The Abacus and Decimal Fractions - Values of Pi - Thirteenth-Century Mathematics.

Unit IV Ancient and Medieval India

Early Mathematics in India - The Sulbasutras - The Siddhantas - Aryabhata - Numerals - Trigonometry - Multiplication - Long Division - Brahmagupta - Indeterminate Equations - Bhaskara - Madhava and the Keralese School. The Islamic Hegemony: Arabic Conquests - The House of Wisdom - Al-Khwarizmi -

Abd Al-Hamid ibn-Turk - Thabit ibn-Qurra - Numerals - Trigonometry - Tenth- and Eleventh-Century Highlights - Omar Khayyam - The Parallel Postulate - Nasir al-Din al-Tusi - Al-Kashi.

Unit V The Latin West

Introduction - Compendia of the Dark Ages - Gerbert - The Century of Translation - Abacists and Algorists - Fibonacci - Jordanus Nemorarius - Campanus of Novara - Learning in the Thirteenth Century - Archimedes Revived - Medieval Kinematics - Thomas Bradwardine - Nicole Oresme - The Latitude of Forms - Infinite Series - Levi ben Gerson - Nicholas of Cusa - The Decline of Medieval Learning. The European Renaissance Overview: Regiomontanus - Nicolas Chuquet"s Triparty - Luca Pacioli"s Summa - German Algebras and Arithmetics - Cardan"s Ars Magna - Rafael Bombelli - Robert Recorde - Trigonometry - Geometry - Renaissance Trends - Franc¸ois Vie`te.

Text Books

Uta C.Merzbach and Carl B. Boyer, (2010), "A History of Mathematics", Third Edition, John Wiley & Sons, Inc., New Jersey.

Unit - I : Chapters 1, 2, 3 and 4 (upto page 58)

1 Unit - II : Chapters 5, 6 and 7

Unit - III: Chapters 8 and 9

Unit - IV: Chapters 10 and 11

Unit - V : Chapters 12 and 13

References

1 David M. Burton, 2011, "The History of Mathematics an Introduction", Seventh Edition, McGraw-Hill, New Delhi

2 Roger L Cooke,2014, "The History of Mathematics", 3rd Edition, Wiley Publications,London

3 John StillWell, 2011, "Mathematics and its History", 3rd Edition, Springer, Newyork

4 Anne Rooney,201, "The History of Mathematics", Rosen Publishing Group, New York

222MT1ASSB	SELF STUDY: INTRODUCTION TO VEDIC MATHEMATICS	SEMESTER III

Total Credits: 1

Syllabus

Unit I Multiplication

Simple method - Criss cross system of multiplication - multiplication of higher-order numbers - technique for multiplying six-digit numbers - technique for multiplying seven-digit numbers squaring numbers: squaring of numbers using crisscross system and formula method - cube root of perfect cubes.

Unit II Perfect squares and Squaring

Square root of perfect squares- Base method of multiplication: when the number of digits in rhs exceeds number of zeros in the base - multiplying a number above the base with a number below the base - multiplying numbers with different bases - when the base is not a power of ten - base method for squaring.

Unit III Dates and Calendars

Digit sum method. - Magic squares: rules and properties - dates and calendars: single year calendar - technique - characteristics of dates.

Unit IV Simultaneous Linear Equations

General equations - simultaneous linear equations - square roots of imperfect squares: characteristics and methods.

Unit V Division

Cubing numbers: formula method and the anurupya sutra - the rule of zeros - Base method of division - division (part two) - substitution method.

Text Books

1 Dhaval Bathia,2005, Vedic Mathematics made easy, first edition,Jaico Publishing House, Mumbai

References

1 Rajesh Kumar Thakur, 2019, "Advanced Vedic Mathematics", first edition, Rupa Publications New Delhi

2 Tirthaji Bharati Krsna, 1990, "Vedic Mathematics", original Edition, Motilal Banarsidass Publisher, New Delhi

3 Atul Gupta, 2010, "The Power of Vedic Maths", second edition, Jaico Publishing House, Mumbai

4 Atul Gupta, 2010, "The Power of Vedic Maths", second edition, Jaico Publishing House, Mumbai

BoS Chairman/HoD
Department of Mathematics
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

Dr.N.G.P. Arts and Science College		
APPROVED		
BoS- 15th	AC - 15th	GB - 20th
12.06.23	14.07.23	05.08.23

Academic Council
Dr.N.G.P. Arts and Science College

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

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

221TL1A4TA	TAMIL - IV	SEMESTER IV

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 – கோவூர்கிழார்
   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/>

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

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

221TL1A4HA	HINDI- IV	SEMESTER IV

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 छोड्कर) 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 चेनैई -17 (पाठ10 to 20). (Unit V)

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

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.

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

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

221TL1A4FA	FRENCH- IV	SEMESTER IV

Total Credits: 3
Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

°Décrirequelqu'un. ° Comparer	En milieu professional, recruiter quelquún et justifier sonchoix.	S'exprimersur les styles de vêtemantReconnaitre des personnes à partit de descriptions.	Comprendre la description de personnesdans un extrait de roman.

Unit II 10 h

ExprimerPaccordou le désaccord. ° Se situerdans le temps.	En milieu professional, recruiter quelquún et justifier sonchoix.	Décrire des personnes. Comprendre des personnes qui experiment leur accord ouleurdésaccord.	Comprendre des différences de points de vueexprimétesdans de message électronique. Raconterunsourvenir.

Unit III 10 h

° Parlerde Pavenir.	Discuter de l'organisation d'un voyage de groupepuisprépar erune fiche projet et la templit.	Comprendreune chanson. Echangersursesprojets de vacancy	Comprendre le message d'une carte d'anniversaire

Unit IV 10 h

° Exprimer des souhaits. °Décrirequel qu'u n	Discuter de l'organisation d'un voyage de groupepuisprépar erune fiche projet et la templit.	Discuter du programme de la soire à venir. Addresser des souhaits à quelqu'un.	Comprendre le message d'une carte d'anniversaire

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 : ReginеMérieux, Yves Loiseau(Unit I to IV)

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

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
222MT1A4CA	ELEMENTS OF MATHEMATICAL ANALYSIS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concept of real number system.
- the notion of metric spaces
- the application of continuity in real number system.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the real number system and its extended form	K1
CO2	define the various forms of sets assigned to real number system	K1
CO3	demonstrate an ability to understand and manipulate the theorems in point set topology	K2
CO4	explain the concept of metric spaces and the influence of limits in it	K2
CO5	apply the concept of continuity in examining the connectedness of sets	K4

MAPPING WITH PROGRAMME OUTCOMES

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

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

222MT1A4CA	ELEMENTS OF MATHEMATICAL ANALYSIS	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I The Real and Complex number system 14 h

Field and order – geometric representation - unique factorization theorem – upper bounds, maximum element, least upper bound - completeness axiom – some properties –Archimedean property – Rational numbers with finite decimal representation and approximations – Infinite decimal representation– absolute values and the triangle inequality –Cauchy-Schwarz inequality- extended real number system.

Unit II Basic notions of Set theory 12 h

Ordered pairs – Cartesian product– Relations and functions – one-to-one functions and inverses – Composite functions – Sequences – similar sets – finite and infinite sets – countable and uncountable sets – uncountability of the real number system – set algebra – countable collection of countable sets.

Unit III Point Set Topology 10 h

Euclidean space – open balls and open sets - structure of open sets - closed sets – adherent and accumulation points – closed sets and adherent points –Bolzano – Weierstrass theorem – Cantor's intersection theorem.

Unit IV Point Set Topology and Metric Spaces 10 h

Lindelof covering theorem –Heine-Borel covering theorem – compactness in R^n-spaces - metric spaces - point set topology - compact subsets – boundary of a set - Limits: convergent sequences – Cauchy sequences – complete metric spaces.

Unit V Limits and Continuity 14 h

Limit of a function - limits of complex valued functions - limits of vector valued functions - continuous functions – continuity of composite functions – continuous complex valued and vector valued functions - examples of continuous functions - continuity and inverse image of open or closed sets - function continuous on compact sets.

Text Books

1 Tom M. Apostol, 2002, "Mathematical Analysis", Second Edition, Narosa Publishing House Pvt. Ltd., New Delhi.

References

1 Somasundaram.D, Choudhary.B.2015, "A first course in Mathematical Analysis", Narosa publishing house, New Delhi.

2 Mainak Mukherjee, 2015, "A course in Real Analysis", Narosa publishing house. New Delhi.

3 Shanti Narayan, Raisinghania M D, 2014, "Elements of Real Analysis", S.Chand and company Pvt. Ltd., New Delhi.

4 Dipak Chatterjee, 2005, "Real Analysis", Prentice- Hall of India Pvt. Ltd., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A4CB	MATHEMATICAL STATISTICS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the core principles of discrete and continuous probability distributions
- how to utilize the sampling distributions to address statistical problems
- the essentials of statistical inference

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify and apply the discrete distribution	K1
CO2	solve problems involving continuous probability distributions	K2
CO3	apply moment generating functions in probability theory.	K2
CO4	analyze and apply F-distributions in complex statistical scenarios.	K3
CO5	explore Blackwellization in statistical inference	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

222MT1A4CB	MATHEMATICAL STATISTICS	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Discrete Probability Distributions 12 h

Introduction - discrete uniform distribution - Bernoulli distribution - Binomial distribution –Poisson distribution.

Problems related to analyze the impact of diseases: Infectious disease-pulmonary disease-bacteriology-cancer-genetics.

Unit II Continuous Probability Distributions 12 h

Introduction - normal distribution –rectangular distribution - gamma distribution.

Representation of continuous random variables in the field of hypertension-cardiovascular disease-infectious disease.

Unit III Exact Sampling Distributions-I 12 h

Introduction - Derivation of the Chi-Square Distribution - moment generating function - theorems - linear transformation – Applications.

Unit IV Exact Sampling Distributions- II 12 h

Introduction- Student's t-distribution- Applications - F-distribution and its applications - relation between t and F-distributions - relation between F and Chi-Square Distributions.

The impact of risk factors in gynecology-cardiovascular disease-pediatrics.

Unit V Statistical Inference 12 h

Introduction – characteristics of estimators – Cramer-Rao inequality – complete family of distributions - MVUE and Blackwellisation.

Estimate the level of risk arising in cardiovascular disease-diabetes-obstetrics-hypertension.

Text Books

1 Gupta S.C and Kapoor V.K, 2022, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi.

2 Bernard Rosner, 2015, " Fundamentals of Biostatistics", United States of America Print, Harvard University USA.

References

1 Gupta. C.B and Vijay Gupta, 2007,"Introduction to Statistical Methods", S.Chand & Co, New Delhi.

2 Sanchetti. D.C and Kapoor V.K, 2010, "Statistic", S.Chand & Co , New Delhi.

3 Veerarajan. T, 2017,"Fundamentals of Mathematical Statistics", Yes Dee Publishing Pvt. Ltd, Chennai.

4 Paul G.Hoel, 2018, "Introduction to Mathematical Statistics", John Wiley India Ltd, NewDelhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A4CC	MATHEMATICAL MODELING	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the art of Mathematical modeling
- complex modeling scenarios using systems of ODEs of first and second order
- the application of linear and non-linear programming, as well as the maximum principle

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify basic modeling techniques	K1
CO2	recognize non-linear growth and decay models	K2
CO3	model epidemics and compartmental situations.	K2
CO4	analyze the influence of difference equations in modeling	K3
CO5	apply the linear programming and maximum principle techniques in modeling.	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

222MT1A4CC	MATHEMATICAL MODELING	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Mathematical Modeling 10 h

Simple situations requiring mathematical modelling- technique – classification – characteristics - Mathematical modelling through Geometry, Algebra, Trigonometry and Calculus - limitations.

Unit II Modeling Through ODE of First Order 9 h

Introduction - linear growth and decay models - non-linear growth and decay models - compartment models - modelling in dynamics - modelling of geometrical problems.

Unit III Modeling Through Systems of ODE of first and Second order 10 h

Population dynamics – epidemics – compartment models - modelling in Economics, Medicine, arms race battles and international trade - planetary motions – circular motion and motion of satellites – modelling through linear differential equations.

Unit IV Modeling Through Difference Equations 10 h

Simple models – basic theory – modelling in Economics, finance, population dynamics, genetics – probability theory- miscellaneous examples.

Unit V Modeling Through Mathematical Programming, Maximum Principle and Maximum-Entropy Principle 9 h

Mathematical modelling through linear programming, non-linear programming - maximum principle- use of principle of maximum entropy.

Text Books

1 J N Kapur, 2015, "Mathematical Modelling", New Age International (P) Limited, New Delhi.

References

1 Bimal K. Mishra and Dipak K Satpathi, 2009, "Mathematical Modelling", First Edition, Ane Books Pvt. Ltd., New Delhi.

2 Walter J. Meyer, 2004, "Concepts of Mathematical Modeling", Dover Publications Inc., New Delhi

3 Edward A. Bender, "An Introduction to Mathematical Modeling", John Wiley & Sons, Inc., New York

4 Giordano, F.R. and Weir, M.D., 1985, "A First Course in Mathematical Modeling", Monterey, Brooks/Cole, Singapore

Course Code	Course Name	Category	L	T	P	Credit
224DA1A4IA	INTRODUCTION TO DATA SCIENCE	IDC	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To provide fundamental knowledge in Data Science Process
- To gain basic knowledge in Machine Learning and Big data and text mining
- To provide basic knowledge in text mining and graph databases

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	understand the concepts of Data science process	K2
CO2	understand the machine learning concepts and its process	K2
CO3	apply Big data techniques for huge data processing	K3
CO4	understand the basic concepts of NoSQL	K2
CO5	implement the graph database and text mining concepts for real world problems	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

224DA1A4IA	INTRODUCTION TO DATA SCIENCE	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Data Science Process 10 h

Benefits and uses of Data Science-Facets of data: Structured data-unstructured data-Natural Language-Machine generated data- Graph based or Network data -Audio, image and video streaming data -Data science process-Big data Eco system and Data Science-Overview of the data science process- Defining research goals and creating a project charter-Retrieving data

Unit II Machine Learning 9 h

Introduction of Machine Learning - The Modeling process - Types of Machine Learning – Supervised Learning, Unsupervised Learning - Semi-supervised Learning - Applications of Machine Learning in data science - Python tools used in Machine Learning

Unit III Big Data Processing 10 h

Problems in handling large data - General techniques for handling large volumes of data - General programming tips for dealing with large data sets - Case Study-Building a recommender system inside a database - First step in big data -Distributing data storage and processing with frame works

Unit IV NoSQL Databases 10 h

Introduction to NoSQL – ACID, CAP theorem - The BASE principles of NoSQL databases - NoSQL database types - Setting the research goal - Data retrieval and preparation - Data Exploration - Case Study: Disease profiling-presentation and automation

Unit V Graph database, Text mining 9 h

Introduction to connected data and graph databases - Introducing Neo4j: A graph database – Connected data example - Text mining in the real world - Text mining techniques - Logical functions - Math functions - Statistical functions

Text Books

1 Davy Cielen, Arno D.B. Meysman, Mohamed Ali, "Introducing Data Science", 2022, 1st Edition, Dream Tech Press

References

1 Manisha Nigam, "Data Analysis with Excel", 2019, 1st Edition, BPB Publications.

2 Murtaza Haider, Getting started with data science, 2016, 1st Edition, Pearson Education

3 Joel Grus, "Data Science From Scratch", 2019, 2nd Edition, O'REILLY.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A4SA	ADVANCED OPTIMIZATION TECHNIQUES	SEC	2	2	-	2

PREAMBLE

This course has been designed for students to learn and understand

- an application of sequencing problems
- the decision-making process
- the strategical thinking to be applied in business

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	identify a number of different situations which can be characterized as sequencing problems	K1
CO2	analyze equipment replacement decisions	K4
CO3	understand various components of a queuing system	K2
CO4	explain the way of making decisions under certainty	K2
CO5	compute value of the game with mixed strategies	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

222MT1A4SA	ADVANCED OPTIMIZATION TECHNIQUES	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 48 h

Syllabus

Unit I Sequencing Problem 10 h

Sequencing problem - solution to sequencing problems - Johnson's rule.

Unit II Replacement Theory 10 h

Failure mechanism of items – considerations leading to replacement – O.R. methodology– replacement policy for equipment/asset which deteriorates gradually – replacement of items that fail suddenly – staff replacement problems.

Unit III Queuing Theory 10 h

Elementary queuing system - single server queuing model - queuing cost behavior analysis - multiple server queuing model - multi-phase service queuing model – benefits and limitations.

Unit IV Decision Analysis 9 h

Management applications - ingredients of decision problem - types of decision-making environments - Bayesian decision rule - posterior analysis - decision tree analysis

Unit V Theory of Games 9 h

Basic Terminology - solution methods of pure strategy games - principle of dominance - solution methods of mixed strategy games – the 2-person, non-zero sum games - limitations.

Text Books

1 Kapoor V.K., 2022, "Operations Research - Quantitative Techniques for Management", Ninth edition, Sultan Chand & Sons, New Delhi

References

1 Kandi Swarup, Gupta P.K, Man Mohan. 2018. "Operations Research", 19th Edition, Sultan Chand & Sons, New Delhi

2 Panneerselvam R., 2009, "Operations Research", 2nd Edition, PHI Learning Private Limited, New Delhi

3 Taha, H.A., 2006, "Operations Research: An Introduction", 5th Edition. Prentice Hall of India Private Limited, New Delhi

4 Man Mohan, Gupta. P.K, 2004, "Problems in Operations Research", 14th Edition, Sultan Chand & Sons, New Delhi

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Course Code	Course Name	Category	L	T	P	Credit
222MT1A5CA	MODERN ALGEBRA	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the applications of group and semi-group concepts
- the concepts of ring theory, field and integral domain
- the applications of polynomial rings with rational fields

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the properties of groups and subgroups	K1
CO2	explain the theories that lead to permutation group	K2
CO3	understand the nature of Sylow's theorem	K2
CO4	illustrate the concepts of rings, ideals and quotient rings	K3
CO5	apply the conceptual knowledge of polynomial rings in different field	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

222MT1A5CA	MODERN ALGEBRA	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Groups 9 h

Group - definition - examples - preliminary lemmas - subgroups – counting principle.

Unit II Normal Subgroups 10 h

Normal subgroups and quotient groups - homomorphisms - automorphisms – Cayley's theorem.

Unit III Sylow's Theorem 9 h

Sylow's theorem - second proof - third proof - third part of Sylow's theorem - direct products -definitions- finite abelian groups.

Unit IV Ring Theory 10 h

Definition and examples of rings – some special classes of rings - homomorphisms - ideals and quotient rings – more ideals and quotient rings - the field of quotients of an integral domain.

Unit V Euclidean and Polynomial Rings 10 h

Euclidean rings – particular Euclidean ring – polynomial rings - polynomials over the rational field - polynomial rings over commutative rings.

Text Books

1 Herstein I. N., 2004, "Topics in Algebra", Second Edition, John Wiley & Sons, New York.

References

1 Surjeet Singh and Qazi Zameeruddin, 1992, "Modern Algebra", Vikas Publishing House, New Delhi.

2 Vasishtha A.R., 1994, "Modern Algebra", Krishna Prakashan Mandir, Meerut.

3 Arumugam S and Thangapandi Isaac A., 2014, "Modern Algebra", Scitech Publications (India) Pvt. Ltd., New Delhi.

4 Venkatachalapathy S. G, "Modern Algebra (For B.Sc. Mathematics Major)", Margham Publications, Chennai.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A5CB	REAL ANALYSIS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- about limits, continuity of a function and its applications
- the methods of bounded variation and total variation
- the concept of Riemann - Stieltjes Integrals

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	determine the importance of limits and continuity	K2
CO2	understand the importance of Rolle's theorem, Mean- Value theorem	K3
CO3	interpret the concept of bounded variation and total variation	K4
CO4	apply and prove the theorems concerning Riemann-Stieltjes integration	K2
CO5	explain the methodology of properties of Riemann-Stieltjes Integrals	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

222MT1A5CB	REAL ANALYSIS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Limits, Continuity and Connectedness 13 h

Topological mappings (homeomorphism) - Bolzano's theorem - connectedness - components of a metric space - arc wise connectedness - uniform continuity - uniform continuity and compact sets - Fixed point theorem for contraction - discontinuities of real valued functions - monotonic functions - derivatives and continuity – algebra – The chain rule – one-sided derivatives and infinite derivatives – functions with non-zero derivative – zero derivatives and local extrema.

Unit II Derivatives 14 h

Rolle's theorem – Mean-value theorem – Intermediate-value theorem for derivatives – Taylor's formula with remainder - derivatives of vector valued functions - partial derivatives - differentiation of functions of a complex variable - Cauchy-Riemann equations - properties of monotonic functions.

Unit III Functions of Bounded Variation 13 h

Total variation – additive property – total variation on [a, x] as a function of x - functions of bounded variation expressed as the difference of increasing functions – continuous functions of bounded variation - curves and paths - rectifiable paths and arc length.

Unit IV The Riemann – Stieltjes Integral 10 h

Introduction - definition of Riemann - Stieltjes integral – linear properties – integration by parts – change of variables – reduction to a Riemann integral - step functions - reduction to a Riemann - Stieltjes integral to a finite sum - Euler's summation formula - monotonically increasing integrators - additive and linearity properties - Riemann's condition - comparison theorems - integrators of bounded variation.

Unit V Properties of Riemann – Stieltjes Integral 10 h

Necessary and sufficient condition for existence of Riemann – Stieltjes integral - Mean value theorem - integral as a function of the interval - second fundamental theorem - change of variable - second mean value theorem - Riemann – Stieltjes integral depending on a parameter - differentiation under the integral sign - interchanging the order of integration.

Text Books

1 Tom M Apostol, 2002, "Mathematical Analysis", Second Editon, Narosa Publishing House Pvt Ltd., New Delhi.

References

1 Somasundaram D and Choudhary B, 2015, "A First Course in Mathematical Analysis", Narosa Publishing House, New Delhi.

2 Mainak Mukherjee, 2015, "A Course in Real Analysis", Narosa Publishing House, New Delhi.

3 Shanti Narayan and Raisinghania M.D., 2014, "Elements of Real Analysis", S. Chand and company Pvt. Ltd., New Delhi.

4 Dipak Chatterjee, 2005, "Real Analysis", Prentice- Hall of India Pvt. Ltd., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A5CC	NUMBER THEORY	CORE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concept of number, its forms and laws regarding its behavior
- the applications of various theorems on prime numbers
- the different forms of functions and symbols related to the numbers

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	identify the greatest common divisor and understand the Euclidean algorithm and division algorithm	K1
CO2	recognized the importance of Goldbach conjecture and representations of integers	K1
CO3	demonstrate Euclidean algorithm, Chinese remainder theorem and Fermat's theorem	K2
CO4	interpret the Euler's theorem and Euler's Phi function	K3
CO5	explore the significance of number theory in cryptography	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

222MT1A5CC	NUMBER THEORY	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Preliminaries and Divisibility Theory in the Integers 9 h

Mathematical induction - Binomial theorem - division algorithm - greatest common divisor - Euclidean Algorithm - Diophantine equation ax+by=c.

Unit II Primes and theory of Congruences 10 h

Fundamental theorem of arithmetic - Sieve of Eratosthenes - Goldbach conjecture - basic properties of congruence - binary and decimal representations of integers - linear congruences and the Chinese remainder theorem.

Unit III Fermat's Theorem and Number-Theoretic Functions 9 h

Pierre de Fermat - Fermat's little theorem and pseudoprimes – Wilson's theorem - sum and number of divisors - Mobius inversion formula - greatest integer function.

Unit IV Euler's Generalization, Primitive Roots and Indices 10 h

Euler's Phi function - Euler's theorem - order of an integer modulo n-Primitive roots for primes - Euler's criterion - Legendre symbol and its properties.

Unit V Cryptography 10 h

From Caesar Cipher to public key cryptography - Knapsack cryptosystem - application of primitive roots to cryptography.

Text Books

1 David M Burton, 2011, "Elementary Number Theory", Seventh Edition, McGraw Hill Education (India) Private Limited, New York.

References

1 Ivan Nivan and Herberts Zucherman, 2011, "An Introduction to Theory of Numbers", 5th Edition, Wiley Eastern Limited, New Delhi.

2 Melvyn B Nathanson, 2006, "Methods in Number Theory", Springer International Edition, New York.

3 Kenneth H Rosen, 1983, "Elementary Number Theory and its Applications", Addison-Wesley Publishing Company, London.

4 George E Andrews, 1994, "Number Theory", Dover Publications, New York.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A5EP	PROGRAMMING IN MATLAB	CORE	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- the basic features of MATLAB environment
- the necessity of build - in functions in MATLAB
- the method of plotting graphs in 2D form

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the basic features and functions of various commands	K1
CO2	illustrate the method of creating arrays using MATLAB	K2
CO3	explain various operations using MATLAB	K3
CO4	discuss the importance of script files	K4
CO5	interpret the given data in the form of graphs	K5

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

222MT1A5EP	PROGRAMMING IN MATLAB	SEMESTER V

Total Credits: 5

Total Instruction Hours: 84 h

Syllabus

(Embedded)

Unit I Starting with MATLAB 16 h

MATLAB windows- working in the command window- arithmetic operations with scalars- display formats- elementary MATH built-in functions- defining scalar variables- useful commands for managing variables- script files- examples of MATLAB applications.

Practical

1 Creating a matrix using MATLAB

2 Write a simple program with arithmetic operators

3 Creating a MATLAB program with script file

4 Creating a MATLAB program with function file.

Unit II Creating Arrays 17 h

Creating a one-dimensional array (vector)- creating a two-dimensional array (matrix)- notes about variables in MATLAB-transpose operator- array addressing- using a colon : in addressing arrays- adding elements to existing variables- deleting elements- built-in functions for handling arrays- strings and strings as variables.

Practical

5 Write a simple program to generate Fibonacci numbers

6 Write a simple program to calculate a compound interest

7 Write a program to check whether the given number is odd or even

8 Write a program to find the electricity bill

Unit III Mathematical Operations with Arrays 17 h

Addition and subtraction- array multiplication-array division- element-by-element operations-using arrays in MATLAB built-in math functions-built-in functions for analyzing arrays- generation of random numbers- examples of MATLAB applications-problems

Practical

9 Write a MATLAB program for solving three linear equations

10 Write a MATLAB program to find the inverse of a Matrix.

11 Write a program to use least square approximation to find the solution of the consistent system

12 Write a program to find the Pseudo inverse of the singular matrix

Unit IV Two-Dimensional Plots 17 h

The plot command- fplot command- plotting multiple graphs in the same plot- formatting a plot- plots with logarithmic axes- plots with error bars- plots with special graphics – histograms- polar plots- putting multiple plots on the same page- multiple figure windows- plotting using the plots tool strip- examples of MATLAB applications.

Practical

13 Calculate and plot the position, velocity and acceleration of the piston for one revolution of the crank using MATLAB

14 Write a MATLAB for plotting multiple diagram in a single window

15 Calculating the Electric Dipole using MATLAB

16 Write a MATLAB to create multiple figure windows

Unit V User-Defined Functions, Function Files and Applications in Numerical Analysis 17 h

Creating a function file- structure of a function file- local and global variables- saving a function file- using a user-defined function- examples of simple user-defined functions- comparison between script files and function files.

Solving an equation with one variable- finding a minimum or a maximum of a function- numerical integration- ordinary differential equations- examples of MATLAB applications.

Practical

17 Find the solution of the algebraic equation

18 Use MATLAB to apply numerical integration methods

19 Use MATLAB to solve the differential equation

20 Write a MATLAB program to find minimum and a maximum value of a given function.

Text Books

1 Amos Gilat, 2017, "MATLAB An Introduction with Applications", John Wiley & Sons, Inc., London.

References

1 Ramin S. Esfandiar, 2017, "Numerical Methods for Engineers and Scientists Using MATLAB", Second Edition, CRC Press, New York.

2 Kattan, Peter I, 2014, "MATLAB for Beginners: A Gentle Approach", Revised Edition, Petra Books, Canada.

3 Mikhailov and Eugeniy E, 2018, "Programming with MATLAB for Scientists: A Beginner's Introduction", CRC Press, New York.

4 Kirani Singh Y., and Chaudhuri B.B., 2007, "MATLAB Programming", First Edition, PHI Learning, New Delhi.

222MT1A5SP	R PROGRAMMING LAB	SEMESTER V

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Create and modify R data sets
2	Create bar charts, pie charts, box plots and scatterplots
3	Perform and interpret correlation analysis
4	Perform and interpret simple and multiple linear regression
5	Perform and interpret one and two sample z-tests
6	Perform and interpret two sample population proportions tests
7	Perform and interpret two sample population standard deviation tests
8	Perform and interpret one and two sample t – tests
9	Perform and interpret Chi - square test for 2x2 tables
10	Perform and interpret paired t and U–tests
11	Perform and interpret Chi - square test for goodness of Fit
12	Create time series objects and plot multiple time series in one chart
13	Write R code to the function by using if-else command. $f(x) = x \ if \ x < \frac{1}{2}$ $= (1-x) \ if \ \frac{1}{2} < x < 1$ $= 0 \ otherwise$
14	Write a R function to find sample covariance
15	Write R code for paired t-test. Also interpret the results as obtained in R.

Note: Out of 15 - 12 is Mandatory.

References

1. Kerns G.J., 2010, "Introduction to Probability and Statistics Using R (preprint)", First Edition.
2. Brain S. Everitt and Torsten Hothorn, 2005, "A Hand Book of Statistical Analyses Using R", Taylor & Francis Group, LLC, New York.
3. Norman Matloff, 2011, "The Art of R Programming", Chapman & Hall/CRC Taylor & Francis Group, New York.
4. Jane M Horgan, 2020, "Probability with R", second edition, John Wiley & Sons Inc., New York.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A5DA	FUZZY SETS AND FUZZY LOGIC	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the basic knowledge of fuzzy set theory
- the construction of fuzzy logic
- the relations between crisp and fuzzy in applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the concept of crisp and fuzzy set	K1
CO2	understand the concept of operations on fuzzy sets	K2
CO3	provides the several relations according to the fuzzy set theory and possibility theory	K3
CO4	relates the conceptual knowledge of fuzzy in fuzzy clustering; Fuzzy image processing, fuzzy decision making and fuzzy ranking methods	K4
CO5	explores the objective of fuzzy in real time applications	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

222MT1A5DA	FUZZY SETS AND FUZZY LOGIC	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fuzzy Sets and Operations on Fuzzy Sets 10 h

Properties of α-cuts – representation - extension principle for fuzzy sets - standard fuzzy operations - combinations of operations - aggregation operations.

Unit II Fuzzy Relations 9 h

Crisp versus fuzzy relations – projections - binary fuzzy relations - binary relations on a single set - fuzzy equivalence relations - compatibility relations - ordering relations - fuzzy morphisms.

Unit III Possibility Theory 9 h

Fuzzy measures - evidence theory - possibility theory - fuzzy sets and possibility theory.

Unit IV Fuzzy Systems 10 h

Fuzzy controllers - fuzzy systems and neural networks - fuzzy automata - fuzzy dynamic systems.

Unit V Pattern Recognition & Fuzzy Decision Making 10 h

Fuzzy clustering - fuzzy pattern recognition - fuzzy image processing - individual and multiperson decision making - multicriteria and multistage decision making - fuzzy ranking methods.

Text Books

1 Klir G J and Yuan B, 1995, "Fuzzy sets and Fuzzy Logic: Theory and Applications", PHI Learning Private Limited, New Delhi.

References

1 Zimmermann H. J., 2011, "Fuzzy Set Theory and its Applications", 4th Edition, Springer, New York.

2 Timothy and Ross J, 2011, "Fuzzy Logic with Engineering Applications", 3rd Edition, Wiley, New Delhi

3 Bhargava A. K., 2013, "Fuzzy Set Theory, Fuzzy Logic and their Applications", S. Chand Pvt. Limited, New Delhi.

4 Rajasekaran S, Vijayalakshmi Pai G. A., 2003, "Neural Networks, Fuzzy Logic and Genetic Algorithms - Synthethesis and Applications", Prentice Hall of India Pvt. Ltd., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A5DB	DISCRETE MATHEMATICS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concepts of probability theory
- the application of relation
- the method of designing finite state machines

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	define the basic concepts of counting	K1
CO2	discuss the some counting techniques	K2
CO3	explain the concept of relations and their applications	K2
CO4	illustrate the Boolean functions	K3
CO5	construct the regular grammar and finite state machine	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

222MT1A5DB	DISCRETE MATHEMATICS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Counting 9 h

Basic of counting - Pigeonhole principle - permutations and combinations - discrete probability - probability theory - generalized permutations and combinations.

Unit II Advanced Counting Techniques 9 h

Recurrence relations - solving recurrence relations - divide and conquer relations - generating functions - inclusion-exclusion.

Unit III Relations 10 h

Relations and their properties - n-ary relations and their applications - representing relations - closures of relations - equivalence relations -partial orderings.

Unit IV Boolean Algebra 10 h

Boolean functions - representing Boolean functions - logic gates - minimization of circuits.

Unit V Modeling Computation 10 h

Languages and grammars - finite state machines with output - finite state machines with no output - language recognition.

Text Books

1 Kenneth H Rosen, 1999, "Discrete Mathematics and its Applications", Fourth Edition, McGraw-Hill Publishing Company Ltd., New Delhi.

References

1 Tremblay J.P and Manohar R.P, 1995, "Discrete mathematical structures with applications to computer science", McGraw Hill, New Delhi.

2 Kolman B, Busby R.C. and Ross S.C, 2018, "Discrete Mathematical Structures", 6th Edition, Prentice hall of India Pvt. Ltd, New Delhi.

3 Seymour Lipschutz and Marc Lipson, 2009, "Schaums outline of Discrete Mathematics", McGraw-Hill, New Delhi.

4 Susanna S. Epp., 2019, "Discrete Mathematics with Applications", Fifth Editon, Cengage Learning, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A5DC	MATHEMATICAL FOUNDATIONS IN CRYPTOGRAPHY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the significance of mathematical concepts in cryptography for securing communication and data
- the concept of secret code generation using cryptographic algorithms which are based on mathematical problems
- the prime numbers, modular arithmetic and other number-theoretic concepts form the basis for creating secure cryptographic systems.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	identify and utilize different forms of cryptography techniques	K2
CO2	use mathematical principles, including number theory and algebra, to secure information and protect against unauthorized access	K3
CO3	apply the concepts of fields in cryptographic algorithm like RSA, ELGammal, ECC	K3
CO4	generate a secure random numbers in many cryptographic applications to produce unpredictable and unbiased sequences of numbers as secret key.	K4
CO5	use hash functions for ensuring data integrity by generating a hash value for an input	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

222MT1A5DC	MATHEMATICAL FOUNDATIONS IN CRYPTOGRAPHY	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Computer Security Concepts and Symmetric ciphers 9 h

Definition of computer security - challenges of computer security - OSI security architecture – security attacks - model of security attacks - Cipher techniques - substitution techniques - transportation techniques.

Unit II Modular Arithmetic 9 h

Divisibility and the division algorithm - euclidean algorithm - modular arithmetic - groups.

Unit III Rings and Finite fields 10 h

Rings, fields - finite fields of the form GF(p) - polynomial arithmetic - finite fields of the form GF(2n).

Unit IV Public Key Cryptography 10 h

RSA Algorithm- Diffie Hellman key exchange - elgamal cryptosystem - elliptic curve arithmetic - elliptic curve cryptography - pseudorandom number generation based on an asymmetric cipher.

Unit V Cryptographic Hash functions 10 h

Applications of cryptographic hash functions - two simple hash functions - requirements and security - hash functions based on cipher block chaining - secure hash algorithm.

Text Books

1 William Stallings, 2006, "Cryptography and Network Security - Principles and Practice", Fifth Edition, Pearson Education, New Delhi.

References

1 Whitman, 2012, "Principles of Information Security", Fourth Edition, Cengage Thomson, Boston.

2 Koshy T., 2002, "Elementary Number Theory with Applications", Elsevier Publications, New Delhi.

3 Grimaldi, R.P and Ramana, 2007, B.V., "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, New Delhi.

4 Jacobson N, 1991, "Basic Algebra I", Hindustan Publishing Company, New Delhi.

222MT1A5GA	GENERIC ELECTIVE: VEDIC MATHEMATICS	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Simple techniques 4 h

Subtraction from 100/1000/10000 - normal method - Vedic method - Multiplication with a series of 9s.

Unit II Operations with 9 and 11 6 h

Operations with 9: Computation of remainder on dividing a number by 9 - basic method - first and second enhancement – verification of the product of two numbers - verification of the sum and difference of two numbers - operations with 11 : multiplication – divisibility test of numbers by 11 – multiplication with 111.

Unit III Multiplication (Nikhilam and Urdha Tiryak) 5 h

Nikhilam: Secondary bases of 50 – secondary bases of 250 - secondary bases of 500 - UrdhaTiryak: 2 digit multiplication – 3 digit multiplication - multiplying 3-digit and 2-digit numbers.

Unit IV Division and Simple Squares 4 h

Division by a flag of one digit (no & with remainder) - division with adjustments - division with a flag of 2 digits and 3 digits - squares: numbers ending in 5 - two numbers starting with same digit and ending digits adding upto 10 - square of any number - Dwandwa or Duplex.

Unit V Square and Cube Roots 5 h

Perfect square root - square root with adjustments - computing cubes of 2-digit numbers - cube roots of 2 digit numbers - computing fourth power of 2-digit numbers.

Text Books

1 Atul Gupta, 2010, "The power of Vedic Maths", Second Edition, Jaico Publishing House, Mumbai.

References

1 Tirthaji Bharati Krsna, 2015, "Vedic Mathematics", original Edition, Motilal Banarsidass Publisher, New Delhi.

2 Rajesh Kumar Thakur, 2013, "The Essentials of Vedic Mathematics", First Edition, Rupa Publications India, New Delhi.

3 Pandit Ramnandan Shastri, 2018, "Vedic Mathematics made Easy", First Edition, Arihant Publications, New Delhi.

4 Dhaval Bathia, 2005, "Vedic Mathematics made easy", First Edition, Jaico Publishing House, Mumbai.

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Academic Council * Dr.N.G.P. Arts and Science College * CHAIRMAN 17/04/2024

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6CA	COMPLEX ANALYSIS	CORE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the integration technique for complex functions
- the singularities and its applications
- the applications of power series

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	describe the arrangement of points in a complex plane	K1
CO2	discuss the characteristics of analytic functions	K2
CO3	express the analytic functions in the form of power series	K2
CO4	explain various forms of Bilinear transformation	K3
CO5	compute the integral values of a complex function	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

222MT1A6CA	COMPLEX ANALYSIS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Complex plane 10 h

Representation of complex numbers - roots - angle between two rays – equations of straight lines and circles – elementary transformation – infinity and extended complex plane – stereographic projection- closed sets – open sets – theorems on bounded infinite sets – examples.

Unit II Analytic functions 9 h

Complex functions - limits – continuity – uniform continuity – differentiability and analyticity – necessary and sufficient conditions for differentiability – C-R equation in polar coordinates -complex function as a function of z and conjugate – examples.

Unit III Power Series 10 h

Power series - absolute and uniform convergence - analyticity of power series – representation of a function by power series- elementary functions -exponential functions – logarithmic functions and function a^z - branch point – trigonometric, hyperbolic and harmonic functions – examples.

Unit IV Elementary and Conformal mappings 9 h

Bilinear transformation – special bilinear transformations – circles and inverse points-transformations $w = z^2$, $w = \sqrt{z}$, $w = e^z$, $w = \frac{z+1}{z}$, $w = \log z$, $w = \sin z$ *and* $w = \cos z$ -conformal z mappings – examples.

Unit V Complex Integration 10 h

Simple rectifiable oriented curves – integration of complex functions –definite integrals – interior and exterior of closed curve - simply connected region – Cauchy's fundamental theorem – integral along an arc joining two points - Cauchy's integral formula and formula for derivatives -zeros - related integral theorem – term by term differentiation and integration – examples.

Text Books

1 Durai Pandian P and Kayalal Pachaiyappa., 2014, "Complex Analysis", S.Chand and Company Pvt. Ltd., New Delhi.

References

1 Shanthi Narayan and Mittal. P.K., 2008., Theory of functions of complex variables, S. Chand and Company Pvt. Ltd, New Delhi.

2 Pundir S.K. and Gupta K.P., Goyal J.K., 2014., Complex Analysis., Pragati Prakashan, Meerut.

3 Lars V. Ahlfors, 1979, "Complex Analysis", Third Edition, Mc Graw-Hill Book Company, New York.

4 Joseph Bak and Donald J. Newman, 2010, "Complex Analysis", Third Edition, Springer, New York.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6CB	LINEAR ALGEBRA	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the applications of linear equations and vector space
- the concepts of linear transformations along with the properties
- the determinant functions and inner product spaces

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	learn about the linear transformations and linear isomorphism	K1
CO2	demonstrate the application of vector spaces in linear transformations	K2
CO3	estimate the determinant function and inner product	K2
CO4	construct the linear functional, conics and quadrics	K3
CO5	demonstrate the Eigen values and Eigen vectors	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

222MT1A6CB	LINEAR ALGEBRA	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I System of Linear Equations and Vector Spaces 14 h

System of linear equations – vector subspaces- basis and dimension of a vector space - line - quotient space

Unit II Linear Transformations 12 h

Linear transformation – representation of linear maps by matrices - kernel and image - linear isomorphism - geometric ideas and some loose ends - some special linear transformations.

Unit III Inner Product Spaces 12 h

Inner product spaces - orthogonality - some geometric applications - orthogonal projection into a line - orthonormal basis - orthogonal complements and projections.

Unit IV Determinants 10 h

2x2 determinant as area of parallelogram - properties - computation - basic results - orientation and vector product

Unit V Diagonalization and Classification of Quadrics 12 h

Rotation of axis of conics - Eigen values and Eigen vectors – diagonalization of symmetric matrices - conics and quadrics – computational examples

Text Books

1 Kumaresan S, 2001, "Linear Algebra: A Geometric Approach", PHI Learning Pvt Ltd, Delhi.

References

1 Herstein I. N, 2002, "Topics in Algebra", 2nd Edition, Narosa Publishing House, New Delhi.

2 Serge Lang, 2011, "Linear Algebra", 2nd Edition, Springer Verlag Publisher House, New York.

3 Gilbert Strang, 2005, "Linear Algebra and its Applications", 4th edition, Brooks Cole, Singapore.

4 Gilbert Strang, 2016, "Introduction to Linear Algebra", 5th Edition, Wellesley - Cambridge Press, Wellesley.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6EP	FUNDAMENTALS OF COMPUTING AND PYTHON PROGRAMMING	CORE	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- the basics of algorithmic problem solving
- to solve problems using Python conditionals and loops
- Python functions and use function calls to solve problems

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	develop algorithmic solutions to simple computational problems.	K1
CO2	develop and execute simple Python programs	K2
CO3	write simple Python programs using conditionals and looping for solving problems	K2
CO4	decompose a Python program into functions.	K3
CO5	represent compound data using Python lists, tuples, dictionaries	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

222MT1A6EP	FUNDAMENTALS OF COMPUTING AND PYTHON PROGRAMMING	SEMESTER VI

Total Credits: 5

Total Instruction Hours: 84 h

Syllabus

(Embedded)

Unit I Computational Thinking and Introduction to Python 12 h

Fundamentals of Computing – identification of computational problems - algorithms, logical and algorithmic thinking - defining the problem - devising the solution -decomposition - the way of the program.

Practical

1 Write an algorithm to add two numbers by a user

2 Write an algorithm to find all roots of a quadratic equation $ax^2 + bx + c = 0$

3 Write a program for transpose of a matrix

4 Write a program to find the distance between two points

5 Write a program to find the cubic root of given equations

Unit II Variables, Expressions and Statements 16 h

Values and types – variables - variable names and keywords – statements - operators and expressions - order of operations - string operations - debugging.

Practical

6 Write a program for addition and subtraction of complex numbers

7 Write a program to check for finding vertex, focus and directrix of a parabola

8 Write a program to find the smallest root of the equation x^2 + s(x)*x – n = 0, where s(x) is the sum of digits of root [x]

9 Write a program to calculate surface area and volume of a cylinder using local and global variables

Unit III Control Flow, Functions and Strings 18 h

Function definition - function call - flow of execution - parameters and arguments - return values - local and global scope – recursion. Conditionals: Boolean values and operators - conditional(if) - alternative (if-else) - chained conditional (if-elif-else) - Iteration: state, while, for, break, continue, pass. Fruitful functions: return values - function composition - boolean functions – recursion. Strings: string slices – immutability - string functions (looping and counting) and methods - string comparison.

Practical

10 Write a program to solve for system of linear equations (n linear equations as input using augmented matrix method)

11 Write a program to print a pattern using recursion

12 Write a program to find the area of Tetrahedron using functions with parameters

13 Write a program to compute the value of $x^3+ 6x^2 + 2x - 1 \; for \; x = 3$

Unit IV Lists, Dictionaries and Tuples 18 h

Lists: list operations - list slices - list methods - list loop – mutability – aliasing - list arguments. Dictionaries: Dictionary as a set of counters - looping and dictionaries - reverse lookup - dictionaries and lists. Tuples: tuple assignment - tuple as return value - lists and tuples - dictionaries and tuples.

Practical

14 Write a program to find the complex root of the equation $x^2 + 1 = 0$ by Newton's methods

15 Write a Python program to generate (given an integer n) a square matrix filled with elements from 1 to n raised to the power of 2 in spiral order

16 Given an array of names of candidates in an election. A candidate name in the array represents a vote cast to the candidate. Using Dictionary, write a program to print the name of candidates received Max vote. If there is tie, print a lexicographically smaller name

17 Write a program to draw a circle using polar equation and Bresenham's equation

Unit V Files 20 h

Persistence - reading and writing - format operator - filenames and paths - catching exceptions – databases – pickling – pipes - writing modules

Practical

18	Write a program to convert a text file with math problems to a text file with the answers to those problems
19	Write a program to check whether the file exists or not
20	Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file

Text Books

1 Karl Beecher, 2017, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, United Kingdom.

2 Allen B. Downey, 2016, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, United States.

References

1 Balagurusamy E, 2020, "Object Oriented Programming with C++", 8th Edition, McGraw Hill, United States.

2 Paul Deitel and Harvey Deitel, 2021, "Python for Programmers", Pearson Education, 1st Edition, United Kingdom.

3 Venkatesh G and Madhavan Mukund, 2021, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, India

4 John V Guttag, 2021, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, Massachusetts.

222MT1A6SP	LINEAR PROGRAMMING USING SPREADSHEET	SEMESTER VI

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Give Mathematical Formulation in the form of a linear programming for a biological system with qualitative data with LibreOffice Calc
2	Solve for maximization of a Linear Programming (LP) problem representing a Biological system using Simplex method in LibreOffice Calc
3	Solve for minimization of a Linear Programming (LP) problem representing a Biological system using Simplex method in LibreOffice
4	Obtain solution for Quadratic Programming Problem using LibreOffice Calc
5	Solve Integer Programming Problem using LibreOffice Calc
6	Obtain solution for Goal Programming Problem using LibreOffice Calc
7	Solve Balanced Transportation Problem using LibreOffice Calc
8	Obtain a solution for Unbalanced Transportation Problem using LibreOffice Calc
9	Solve Balanced Assignment Problem using LibreOffice Calc
10	Obtain a solution for Unbalanced Assignment Problem using LibreOffice Calc
11	Solve a queueing model that represents a Birth-Death Biological Process Using LibreOffice Calc
12	Compute the shortest route through a "working backward" approach for a model in Mathematical Biology using LibreOffice Calc
13	Compute the value of the game using LibreOffice Calc
14	Identify the best decision for a problem representing cancer development process using LibreOffice Calc
15	Compute inventory cost using libre office Calc

Note: Cut of 15 - 12 is Mandatory.

References

1. LibreOffice Documentation Team, 2020, "LibreOffice Calc 7.0 Guide", The Document Foundation, Germany.
2. Ecclestone T, 2015, "Use LibreOffice Calc: A Beginners Guide", Createspace Independent Publishing Platform, California.
3. LibreOffice Documentation Team, 2019, "Getting Started with LibreOffice 6.0", Friends of OpenDocument, Inc., Australia.
4. Jean Hollis Weber, 2013, "LibreOffice 4.1 Calc Guide", The Document Foundation, Germany.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6DA	CRYPTOGRAPHY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the significance of mathematical concepts in cryptography for securing communication and data
- the concept of secret code generation using cryptographic algorithms which are based on mathematical problems
- the Prime numbers, modular arithmetic, and other number-theoretic concepts form the basis for creating secure cryptographic systems.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify and utilize different forms of cryptography techniques	K2
CO2	use mathematical principles, including number theory and algebra, to secure information and protect against unauthorized access	K3
CO3	Apply the concepts of Fields in cryptographic algorithm like RSA, ELGammal, ECC	K3
CO4	Generate a secure random numbers in many cryptographic applications to produce unpredictable and unbiased sequences of numbers as secret key.	K4
CO5	use hash functions for ensuring data integrity by generating a hash value for an input	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

222MT1A6DA	CRYPTOGRAPHY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Private-key cryptosystems and Public Key cryptosystems 9 h

Advanced Encryption Standard (AES) - overview of modular arithmetic - discrete logarithms and primality/factoring - public-key cryptosystems - ElGamal cryptosystem - signature schemes.

Unit II Discrete logarithm based cryptosystems and signatures 9 h

Elliptic Curve Cryptosystem (ECC) - digital signature standard (dss) - selection of other signature schemes - overview of discrete logarithm algorithms - ethical aspects of public - key cryptosystems and signatures.

Unit III Interactive protocols 8 h

Touch of complexity theory - interactive proof systems - 0-knowledge proof systems - 0-knowledge authentication - electronic cash - Chaum and Brands schemes - private information retrieval.

Unit IV Key management, Distribution and User Authentication Protocol 12 h

Symmetric key distribution using symmetric encryption - symmetric key distribution using asymmetric encryption - distribution of public keys - remote user authentication principle - remote user authentication using symmetric and asymmteric encryption.

Unit V Network and Internet security 10 h

Intruders - intrusion detection - malicious software- types of malicious software- viruses -virus countermeasures –worms - distributed denial of service attacks – firewalls - need for firewalls - firewall characteristics - types of firewalls.

Text Books

1 William Stallings, 2006, "Cryptography and Network Security - Principles and Practice", 5th edition, Pearson Education, London.

References

1 Michael E Whitman, Herbert J Mattord, 2009, "Principles of Information Security", 4th Edition, Cengage Learning, United States.

2 Koshy, T., 2002, "Elementary Number Theory with Applications", Elsevier Publications, New Delhi.

3 Grimaldi R.P and Ramana B.V.,2007, "Discrete and Combinatorial Mathematics", Pearson Education, 5th Edition, New Delhi.

4 N. Jacobson, 1991, "Basic Algebra I", Hindustan Publishing Company, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6DB	GRAPH THEORY	DSE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the way of representation and properties of graphs
- the concept of trees and its applications
- the concepts of matching and planarity with applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	draw and recognize the various forms of graphs and trees	K1
CO2	show the applications of isomorphic graphs	K1
CO3	representation of trees and its types	K2
CO4	construct digraphs for real time problems	K2
CO5	demonstrate the applications of matchings and planar graphs	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

222MT1A6DB	GRAPH THEORY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction of Graphs 11 h

Graphs and graph models - connected graphs - common classes of graphs - multigraphs and digraphs- degrees of a vertex - regular graphs - degree sequences - excursion: graphs and matrices-irregular graphs.

Unit II Isomorphic Graphs 9 h

Isomorphism - isomorphism as a relation - graphs and groups - reconstruction and solvability.

Unit III Trees and Connectivity 10 h

Bridges - trees - minimum spanning tree problem - Excursion: the number of spanning trees - cut-vertices – blocks – connectivity - Menger's theorem - powers and edge labelings.

Unit IV Traversability and Digraphs 9 h

Eulerian Graphs - Hamiltonian graphs - Hamiltonian walks - strong digraphs - tournaments -decision-making - wine bottle problems.

Unit V Matchings, Factorization and Planarity 9 h

Matchings - factorization - decomposition and graceful labelings - Peterson graphs -Planar graphs - embedding graphs on surfaces.

Text Books

1 Gary Chartrand and Ping Zhang, 2012, "A First Course in Graph Theory", 2nd Edition, Dover Publications Inc, New York.

References

1 Narsingh Deo, 1999, "Graph Theory with Applications to Engineering and Computer Science", Prentice Hall of India, New Delhi.

2 Robin J. Wilson, 2010, "Introduction to Graph Theory", 5th Edition, Pearson Education Limited, Essex.

3 Reinhard Diestel, 2017, "Graph Theory", 5th Edition, Springer, Berlin.

4 Harary, 2001, "Graph Theory", Narosa Publishing House Pvt. Ltd, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6DC	MATHEMATICAL FUNDAMENTALS IN PHARMACOKINETICS	DSE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the importance of mathematical rigor in pharmacokinetics
- essential mathematical tools and techniques for understanding drug composition
- to calculate key pharmacokinetic parameters such as clearance, volume of distribution, and half-life

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	algebraically solve mathematical expressions related to pharmacokinetics.	K2
CO2	express the calculated and theoretical pharmacokinetic values in proper units	K2
CO3	understand the significance of statistical methods and its analysis in pharmacokinetic	K2
CO4	use the least squares method to find the best fit straight line through empirically obtained data	K3
CO5	describe the differences between empirical and mechanistic models.	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

222MT1A6DC	MATHEMATICAL FUNDAMENTALS IN PHARMACOKINETICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Pharmaceutical calculations 8 h

Percent- ratio - proportion, variation- dimensional analysis - alligation - significant figures –rules for rounding - estimation.

Unit II International Systems of Units and Pharmaceutical Measurements 9 h

Guidelines - special considerations-measure of length - volume- weight-prescription writing style using the SI - Pharmaceutical measurements: measurement of volume and weight, Aliquot method - least weighable quantity method - percentage of error.

Unit III Fundamentals in Pharmacokinetics 12 h

Calculus – mathematical expressions and units – units for expressing blood concentrations – measurement and use of significant figures - graphs - curve fitting-linear regression/least squares method - rates and order of processes - problems.

Unit IV Biostatistics 10 h

Variables – types of data – distributions –central tendency and variability - hypothesis testing - statistically versus clinically significant differences - statistical inference techniques in hypothesis testing for parametric and nonparametric data - goodness of fit – control versus non-control studies – blinding – confounding – validity – bioequivalence studies – evaluation of risk for clinical studies.

Unit V Empirical and Mechanistic Models, Statistical Moments and Noncompartmental Analysis 9 h

Empirical models - mechanistic models - non compartmental analysis - comparison of different approaches - selection of pharmacokinetic models.

Text Books

1 Howard C. Ansel, Shelly J. Stockton, 2017, "Pharmaceutical Calculations", 15th edition, Wolters Kulwer, London.

[2] Leon Shargel, Andrew B.C. Yu, 2016, "Applied Biopharmaceutics & Pharmacokinetics",7th edition, McGraw-Hill Education, USA.

References

1 Steve Strauss, David W.A. Bourne, 2005, "Mathematical Modeling of Pharmacokinetic Data", Technomic Publishing company, USA.

2 Thomas N. Tozer, Malcolm Rowland, 2011, "Clinical Pharmacokinetics and Pharmacodynamics",4th edition, Wolters Kluwer Health, Philadelphia.

[3] Web site at http://thePoint.lww.com/Ansel15e.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6DD	COMBINATORICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concepts of generating permutations and combinations
- the applications of various forms of combinatorics
- formation of recurrence relations and its solution technique

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	define the permutations and combinations of multi-sets	K1
CO2	describe the equivalence relation through generating permutations and combinations	K2
CO3	compute the binomial coefficient for partial ordered sets	K2
CO4	explain the application of Inclusion-Exclusion principle	K3
CO5	solve various forms of recurrence relations	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

222MT1A6DD	COMBINATORICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Permutations and Combinations 10 h

Four basic counting principles - permutations of sets - combinations (subsets) of sets - permutations of multi-sets - combinations of multi-sets - finite probability.

Unit II Generating Permutations and Combinations 9 h

Generating Permutations-inversions in Permutations-generating Combinations - generating r- subsets - partial orders and equivalence relations

Unit III The Binomial Coefficients 10 h

Pascal's triangle- Binomial theorem- Unimodality of binomial coefficients- multinomial theorem- Newton's Binomial theorem- more on partially ordered sets.

Unit IV The Inclusion-Exclusion Principle and Applications 9 h

The Inclusion-Exclusion principle - Combinations with repetition – derangements - Permutations with forbidden positions - another forbidden position problem - Mobius inversion.

Unit V Recurrence relations and Generating functions 10 h

Number sequences - Generating functions - exponential generating functions - solving linear homogeneous recurrence relations - nonhomogeneous recurrence relations - a geometry example

Text Books

1 Richard A. Brualdi .2019, "Introductory Combinatorics", Fifth Edition, Pearson Education & New Delhi

References

1 Chuan Chong Chen and Khee-mengKoh, 1992, "Principles and Techniques in Combinatorics", World Scientific Publishing & Singapore.

2 Allan Tucker. 2016, "Applied Combinatorics", sixth edition, Wiley & New Delhi.

3 Miklos Bona, 2006, "A walk through Combinatorics", Second Edition, World Scientific Publishing & Singapore.

4 Vasudev. C, 2006, " Theory and Problems of Combinatorics", New Age International Private Limited & New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6DE	AUTOMATA THEORY AND FORMAL LANGUAGES	DSE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the types of grammars and the languages generated by them
- the method of constructing regular and context free grammars
- the applications of pumping lemma and normal forms associated with languages.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	recognize the type of automata generated	K1
CO2	identify the type of languages and derive the associated expressions	K2
CO3	apply the pumping lemma to verify the regular grammar	K3
CO4	analyze the context free languages using pumping lemma	K3
CO5	explain the importance of push down automata and language accepted by it	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

222MT1A6DE	AUTOMATA THEORY AND FORMAL LANGUAGES	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Automata Theory 10 h

Definitions-description of Finite automata -Transition systems-properties-acceptability of a string-Nondeterministic finite state automata-equivalence of DFA and NDFA-minimization-examples

Unit II Formal Languages and Regular Expressions 9 h

Grammars-Language generated by a Grammar-Chomsky classification-Languages and their relations-recursive and recursively enumerable sets- operations-Languages and Automata-Regular expressions-identities-examples.

Unit III Regular Sets and Regular Grammars 10 h

Finite automata and regular expressions-Pumping lemma of regular sets-applications- closure properties-construction of a regular grammar for a DFA and transition system accepting language for a regular grammar – examples.

Unit IV Context Free Languages 10 h

Context free languages-derivation trees-Simplification-Normal forms -Pumping lemma for Context free languages – decision algorithms- examples.

Unit V Pushdown Automata 9 h

Pushdown automata – definitions – acceptance by pda – Top-down parsing – Top-down parsing using deterministic pda's – Bottom-up parsing- examples.

Text Books

1 Mishra. K.L.P, Chandrasekaran. N, (2008), Theory of Computer Science – Automata, Languages and Computation (3rd edition), Prentice-Hall of India Private Limited, New Delhi.

References

1 Nagpal. C.K, (2011), Formal Languages and Automata Theory, Oxford Illustration Edition, Oxford.

2 John E. Hopcroft, Rajeev Motwani, Jeffrey Ullman, (2008), Introduction to Automata Theory, Formal Languages and Computation, Pearson Education India, New Delhi.

3 Kamala Krithivasan, Rama. R, (2009), Introduction to Formal Languages, Automata Theory and Computation, Pearson Education India, New Delhi.

4 Peter Linz, (2011), An Introduction to Formal Languages and Automata, Narosa Publishing House, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A6DF	MATHEMATICAL MODELS IN ECONOMETRICS	DSE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- modern economics is analytical and mathematical in structure
- fundamental methods of mathematical economics
- econometric principles is indispensable for further studies in economics

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	adequate competency in the frontier areas of economic theory and methods	K3
CO2	apply static and dynamic methods to various economic models	K3
CO3	interpret economic implications of differential models	K3
CO4	use difference equation to model, solve and interpret discrete economic dynamics	K3
CO5	apply input-output models and solve optimal control problems	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

222MT1A6DF	MATHEMATICAL MODELS IN ECONOMETRICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Econometrics, Economic Data and Regression model 10 h

Definition – steps in developing an econometric model - economic data – simple regression model – ordinary least squares – characteristics – units of measurement and functional form – assumptions and statistical properties.

Unit II Comparative Statics, Derivative and Dynamic Analysis 10 h

Nature - rate of change and derivative - slope of the curve - rules of differentiation and their use in comparative statics - comparative statics of general function models - dynamic analysis - economic applications - Domar growth model.

Unit III Continuous Time 10 h

First order linear differential equations – dynamics of market price - variable coefficients and variable term – Higher order differential equations: second order linear differential equations – market model with price expectations - interaction of inflation and unemployment.

Unit IV Discrete Time 10 h

Discrete Time – differences and difference equations - first order difference equations -dynamic stability - Cobweb model - market model with inventory - second order linear difference equation - Samuelson multiplier acceleration interaction model - inflation and unemployment.

Unit V Dynamic systems and Optimal Control Theory 8 h

Genesis of dynamic systems - solving simultaneous dynamic equations - dynamic input – output model. Optimal Control Theory: Nature of optimal control - alternative terminal conditions – autonomous problems - economic applications.

Text Books

1 Ezequiel Uriel, 2019, "Introduction to Econometrics", University of Valencia, Spain.

2 Alpha C. Chiang, Kelvin Wainwright, 2005, "Fundamental Methods of Mathematical Economics", 4th Edition, McGraw-Hill, New York.

References

1 Mehta, BC and Madanani GMK, 2008, "Mathematics for Economists", Sultan Chand and Sons, New Delhi.

2 Allen, RGD, 1942, "Mathematical Analysis for Economists", Macmillan and Co. Limited, London.

3 Johnston J, 1996, "Econometric Methods",4th edition, McGraw-Hill Book Co., New York.

Course Code	Course Name	Category	L	T	P	Credit
223BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	AECC- III	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

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

223BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	**SEMESTER** VI

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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