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

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

B.Sc. Degree
(For the students admitted during the academic year 2022-23 and onwards)

Programme: B.Sc. Physics

Eligibility

A pass in Higher Secondary Examination in Academic stream or Vocational stream under Higher Secondary Board of Examination, Tamil Nadu with Physics as one of the subjects and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent there to by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Physics Degree Examination** of this College after a program of study of three Academic years.

Programme Educational Objectives

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

1. Producing graduates who are well acquainted with the fundamentals of Physics and requisite skills, in order to use their knowledge in Physics in a wide range of practical applications.
2. Developing creative thinking and the power of imagination to enable graduates work in research in academia and industry for broader applications.
3. Relating the training of Physics graduates to the employment opportunities within the country.
4. To promote societal values through Physics related activities.

PROGRAMME OUTCOMES:

On the successful completion of the program, the following are the expectedoutcomes.

PO Number	PO Statement
PO1	Demonstrate an understanding of basic scientific principles,theories, and laws in Physics as well as an awareness of the changing nature of science.
PO2	Analyze, interpret, and evaluate scientific hypotheses and theories using rigorous methods use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in Physics.
PO3	Demonstrate basic experimental skills by the practice of setting up and conducting experiments with minimizing measurement errors.
PO4	Demonstrate a qualitative understanding of the core physics ideas and the relationship of this physics to the humanities through both written and oral communication.
PO5	Demonstrate an ability to recognize the need for life-long learningfor sustaining professional career.

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		

UG - Credit distribution - Common for R4 and R5

For students admitted in AY 22-23 and onwards.

Part	Subjects	No. of Papers	Credit	Semester No.
I (12 Credits)	Tamil / Hindi / French/Malayalam	4	4 x 3 = 12	I & IV
II (12 Credits)	English	4	4 x 3 = 12	I & IV
III (108 Credits)	Core (Credits 2,3,4,5)	16-19	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

B.Sc. Physics

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part-I										
221TL1A1TA/ 221TL1A1HA/ 221TL1A1MA/ 221TL1A1FA	Language-I	Tamil-I: Ikkala Ilakkiyam / Hindi-I: Modern Literature / Malayalam-I: Modern Literature/ French–I: Grammar, Translation and Civilization	4	1	-	3	50	50	100	3
Part-II										
221EL1A1EA	Language-II	Professional English -I	4	-	1	3	50	50	100	3
Part-III										
222PY1A1CA	Core- I	Properties of Matter and Sound	4	1	-	3	50	50	100	4
222PY1A1CB	Core -II	Mechanics	4	-	-	3	50	50	100	3
222PY1A1CP	Core practical -I	Properties of matter and Mechanics	-	-	4	3	50	50	100	2
222MT1A1IP	IDC -I	Fundamentals of Mathematics with MATLAB	3	-	2	3	50	50	100	3
Part-IV										
223MB1A1AA	AECC-I	Environmental Studies	2	-	-	-	50	-	50	2
Part – V										
222PY1A1XA	Extension Activity	NSS/NCC/YRC/RRC/Yoga/Sports					50	-	50	1
		Total	**21**	**2**	**7**				**700**	**21**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part-I										
221TL1A2TA/ 221TL1A2HA/ 221TL1A2MA/ 221TL1A2FA	Language-I	Tamil-II: Ara Ilakkiyam Hindi-II: Modern Literature Malayalam-II: Modern Literature French–II: Grammar, Translation and Civilization	4	1	-	3	50	50	100	3
Part- II										
221EL1A2EA	Language- II	Professional English - II	4	-	1	3	50	50	100	3
Part-III										
222PY1A2CA	Core- III	Heat and Thermodynamics	4	-	-	3	50	50	100	4
222PY1A2CB	Core -IV	AtomicPhysics	4	1	-	3	50	50	100	4
222PY1A2CP	Core Practical-II	Heat and Thermodynamics	-	-	4	3	50	50	100	2
222MT1A2IP	IDC- II	Statistical Analysis and Tools	3	-	2	3	50	50	100	4
Part-IV										
221TL1A2AA/ 221TL1A2AB/ 225CR1A2AA	AECC-II	Basic Tamil/ Advanced Tamil/ Human Rights andWomen's Rights	2	-	-	-	50	-	50	2
Part-V										
222PY1A2XA	Extension Activity	NSS/NCC/YRC /RRC/Yoga/ Sports/Clubs					50	-	50	1
		Total	21	2	7				700	23

25.11.2022

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

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

BoS- 14th	AC - 14th	GB - 19th
25.11.2022	19.01.2023	30.01.2023

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

Dr.NGPASC
COIMBATORE | INDIA

Dr.NGPASC
COIMBATORE | INDIA

B.Sc. Physics (Students admitted during the AY 2022-23)

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part-I										
221TL1A3TA/ 221TL1A3HA/ 221TL1A3MA/ 221TL1A3FA	Language-I	Tamil-III/ Hindi-III/ Malayalam-III/ French–III	3	1	-	3	50	50	100	3
Part- II										
221EL1A3EA	Language-II	Professional English -III	3	1	-	3	50	50	100	3
Part-III										
222PY1A3CA	Core -V	Electricity and Magnetism	4	-	-	3	50	50	100	4
222PY1A3CB	Core -VI	Nuclear Physics	3	-	-	3	50	50	100	3
222PY1A3CP	Core practical-III	Electricity and Magnetism	-	-	4	3	50	50	100	2
222CE1A3IP	IDC -III	Chemistry - I	3	-	4	3	50	50	100	5
222PY1A3SP	SEC-I Practical	Basic Computer Skills	2	-	2	3	50	50	100	2
Total			20	-	10				700	22

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

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BoS- 15th	AC- 15th	GB- 24th
12.6.23	14.7.23	5.8.23

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

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
Part-I										
221TL1A4TA/ 221TL1A4HA/ 221TL1A4MA/ 221TL1A4FA	Language-I	Tamil-IV/ Hindi-IV/ Malayalam-IV/ French–IV	3	1	-	3	50	50	100	3
Part- II										
221EL1A4EA	Language-II	Professional English -IV	3	1	-	3	50	50	100	3
Part-III										
222PY1A4CA	Core- VII	Optics and Spectroscopy	4	-	-	3	50	50	100	4
222PY1A4CB	Core -VIII	Principles of Electronics and Communication	4	-	-	3	50	50	100	4
222PY1A4CP	Core practical-IV	Optics and Spectroscopy	-	-	4	3	50	50	100	2
222CE1A4EP	IDC -IV	Chemistry- II	3	-	4	3	50	50	100	5
222PY1A4SA	SEC-II	Concepts and Programming in C	3	-	-	3	50	50	100	2
Total			**20**	**2**	**8**				**700**	**23**

18/10/2023
BoS Chairman/HoD
Department of Physics
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

Dr.N.G.P. Arts and Science College
APPROVED
BoS- 14th 18.10.23 | AC - 12th 13.12.23 | GB - 21st 05.01.24

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

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
Part-III										
222PY1A5CA	Core- IX	Mathematical Physics	4	1	-	3	50	50	100	5
222PY1A5CB	Core -X	Classical and Statistical Methods of Analysis	4	-	-	3	50	50	100	4
222PY1A5CC	Core -XI	Solid State Physics	4	1	-	3	50	50	100	5
222PY1A5CP	Core Practical- V	Advanced Physics	-	-	4	3	50	50	100	2
222PY1A5CQ	Core Practical -VI	C Programming	-	-	4	3	50	50	100	2
222PY1A5SA	SEC-III	Fundamentals of IoT	2	-	-	3	50	50	100	2
222PY1A5DA	DSE-I	Renewable energy Sources	4	-	-	3	50	50	100	4
222PY1A5DB		Laser Physics								
222PY1A5DC		Physics of Devices and Instrumentation								
222PY1A5TA	IT	Industrial Training					50	50	100	2
Part-IV										
	GE		2	-	-	2	50	-	50	2
Total			**20**	**2**	**8**				**850**	**28**

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

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

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
SixthSemester										
Part-III										
222PY1A6CA	Core -XII	Relativity and Quantum Mechanics	4	-	-	3	50	50	100	4
222PY1A6CB	Core -XIII	Digital Electronics and Microprocessors	3	-	-	3	50	50	100	3
222PY1A6CP	Core Practical - VII	Electronics	-	-	4	3	50	50	100	2
222PY1A6CV	Core -XIV	Project and Viva voce	-	-	7	3	50	50	100	4
222PY1A6SA	SEC-IV	Fundamentals of AI	2	-	-	3	50	50	100	2
222PY1A6DA	DSE-II	Nanophysics	4	-	-	3	50	50	100	4
222PY1A6DB		Materials Science								
222PY1A6DC		Radiation Physics								
222PY1A6DD	DSE-III	Solar Photovoltaic Technology	4	-	-	3	50	50	100	4
222PY1A6DE		Astrophysics								
222PY1A6DF		Biomedical Instrumentation								
Part-IV										
223BC1A6AA	AECC-III	Innovation,IPR and Entrepreneurship	2				50	-	50	2
		Total:	**19**	**-**	**11**				**750**	**25**
						***Grand Total:**			**4400**	**142**

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Academic Council
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CHAIRMAN
26/11/24

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COIMBATORE | INDIA

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.	CourseCode	Nameof theCourse
1.	222PY1A5DA	Renewable energy Sources
2.	222PY1A5DB	Laser Physics
3.	222PY1A5DC	Physics of Devices and Instrumentation

Semester VI (Elective II)

List of Elective Courses

S.No.	CourseCode	NameoftheCourse
1.	222PY1A6DA	Nanophysics
2.	222PY1A6DB	Materials Science
3.	222PY1A6DC	Radiation Physics

Semester VI (Elective III)

List of Elective Courses

S.No.	CourseCode	Nameof theCourse
1.	222PY1A6DD	Solar Photovoltaic Technology
2.	222PY1A6DE	Astrophysics
3.	222PY1A6DF	Biomedical Instrumentation

GENERIC ELECTIVE COURSE (GE)

The following are the course offered under Generic Elective Course

Semester V

S.No.	CourseCode	CourseName
1.	222PY1A3GA	Everyday Physics

EXTRA CREDIT COURSES

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

Semester III

S.No.	CourseCode	CourseName
1.	222PY1ASSA	Electrical and Electronic Appliances
2.	222PY1ASSB	Biophysics

Course Code	Course Name	Category	L	T	P	Credit
221TL1A1TA	TAMIL - I:IKKALA 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	K3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு(Tamil knowledge)	K5

MAPPING WITH PROGRAMME OUTCOMES

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

✓	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 - நாமக்கல்கவிஞர்
5. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
6. திரைத்தமிழ்

அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி'எனத்தொடங்கும் பாடல் - உடுமலை நாராயண கவி

ஆ) 'சும்மா கிடந்த நிலத்தை' எனத்தொடங்கும் பாடல் - பட்டுக்கோட்டை கல்யாண சுந்தரனார்

இ) 'சமரசம் உலாவும் இடமே' எனத்தொடங்கும் பாடல்- மருதகாசி

ஈ) 'உன்னை அறிந்தால்' எனத்தொடங்கும் பாடல் - கண்ணதாசன்

Unit II **புதுக்கவிதைகள்** 13 h

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

Unit III **பெண்ணியம்** 09 h

1. தொலைந்து போனேன் - தாமரை

2. நீரில் அலையும் முகம் - அ. வெண்ணிலா

3. தற்காத்தல் - பொன்மணி வைரமுத்து

4. ஏனிந்த வித்தியாசங்கள் ?- மல்லிகா

5. புதையுண்ட வாழ்க்கை - சுகந்தி சுப்ரமணியன்

Unit IV சிறுகதைகள் 15 h

1.இலக்கிய வரலாறு -சிறுகதையின் தோற்றமும் வளர்ச்சியும்

2. கனகாம்பரம் - கு.ப.ராஜகோபாலன்

3. ஆற்றங்கரைப் பிள்ளையார் - புதுமைப்பித்தன்

4. பொம்மை - ஜெயகாந்தன்

5. காய்ச்சமரம் - கி. ராஜநாராயணன்

6. காட்டில் ஒருமான் - அம்பை

7.வேட்கை - சூர்யகாந்தன்

Unit V பயிற்சிப் பகுதி 10 h

அ. இலக்கணம்

1.வல்லின ஒற்று மிகும், மிகா இடங்கள் - ஒற்றுப்பிழை நீக்கி எழுதுதல்

2.ர,ற - ல,ழ,ள - ண,ந,னவேறுபாடு - ஒலிப்பு நெறி,சொற்பொருள் வேறுபாடு அறிதல்)

ஆ. படைப்பாக்கம்

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

2.சிறுகதை - எழுதுதல் (குறைந்தது 3 பக்கங்கள்)

Text Book

1 தமிழ் மொழிப்பாடம் - 2022-2023 ,தொகுப்பு: தமிழ்த்துறை , டாக்டர்என்.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 – नूतनगद्यसंग्रह(जयप्रकाश)पाठ 1- रजियापाठ 2- मक्रीलपाठ 3- बहतापानीनिर्मला
पाठ 4- राष्ट्रपितामहात्मागाँधी

Unit II 13 h

कहानीकुंज- डॉवी.पी. 'अमिताभ'(पाठ 1-4)

Unit III 12 h

व्याकरण : शब्दविचार (संज्ञा, सर्वनाम,विशेषण)

Unit IV 12 h

अनुच्छेद लेखन

Unit V 10 h

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

Text Books

1 प्रकाशक: सुमित्रप्रकाशन 204 लीलाअपार्ट्मेंट्स, 15 हेस्टिंग्सरोड'अशोकनगरइलाहाबाद-211001

2 प्रकाशक: गोविन्दप्रकाशनसदरबाजार, मथुराउत्तरप्रदेश-281001

3 पुस्तक: व्याकरण प्रदिप – रामदेवप्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद-211024

4 पुस्तक: व्याकरण प्रदिप – रामदेवप्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024

5 प्रकाशक: दक्षिण भारत प्रचार सभा 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

PathummayudeAdu

Unit II **Novel** 10 h

PathummayudeAdu

Unit III **Short Story** 14 h

Nalinakanthi

Unit IV **Short Story** 10 h

Nalinakanthi

Unit V **Practical Application** 12 h

Expansion of ideas, General Essay and Translation

Text Books

1. Vaikkam Muhammed Basheer, "PathummayudeAdu" (NOVEL), DC Books & Kottayam
2. Padmanabhan T, "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 deréception et de production orale
• Saluer • Enter en contact • avecquelqu'un. • Se presenter. • S'excuser	Encours 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 deréception 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'adoreI Page 30 — 12 h

Objectifs de Communication	Tâche	Activités deréception et de production orale
• Exprimerses gouts.	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation.	• Dans une soirée de recontresrapid 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'adoreI Page 30 14 h

Objectifs de Communication	Tâche	Activités deréception et de production orale
• Présenterquelqu'un	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• Exprimersesgoûts. • 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. Parlerd'actions passes. Tuveuxbien?	Organiser un programme d'activités pour accueillirunepersonneimportante.	Comprendreunepersonne 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 RegineMerieux, Yves Loiseau, "LATITUDES - 1" (Page No: 9-55)(Methode de Français), Goyal Publisher &DistributorsPvt.Ltd., 86 UB JawaharNagar (Kamala Nagar),Delhi-7 Les Editions Dider, Paris,2008- Imprime en Roumanie par Canale en Janvier 2012.

Course Code	Course Name	Category	L	T	P	Credit
221EL1A1EA	PROFESSIONAL ENGLISH- I	LANGUAGE- II	4	-	1	3

PREAMBLE

This course has been designed for students to learn and understand

- The effect of dialogue, the brilliance of imagery and the magnificence of varied genres
- Any spontaneous spoken discourse and respond to them with proper sentence structure
- The transactional concept of English language

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify the various aspects in poetry	K2
CO2	Infer linguistic and non-linguistic features of the context for understanding and interpreting	K3
CO3	Construct sentences and convey messages effectively in real life situations	K3
CO4	Apply different reading strategies with varying speed	K3
CO5	Prepare modules with their own ideas and present them coherently in a grammatically correct form	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

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

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

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

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

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

Unit II Listening Skills 12 h

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

Unit III Speaking Skills 14 h

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

Unit IV Reading Skills 10 h

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

Unit V Writing Skills 12 h

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

Text Books

1 Gardiner, A. G. 1926. Alpha of the Plough: Second series, J.M. Dent & Sons Ltd., London, United Kingdom. pg.no-151-156. (Unit I)

2 Ezekiel, Nissim. "The Worm," Crazy Romantic Love, www. mianmawaisarain.live/2020/05/poem-worm-nissim-ezekiel.html. Accessed 3 Aug. 2022. (Unit I)

3 < http://livros01.livrosgratis.com.br/ln000835.pdf /> (Unit I)

4 Mithra, S. M. 1919. Hindu Tales from the Sanskrit, Macmillan & Co Ltd., London, United Kingdom. pg.no-127-142. (Unit I)

5 Nation, I. S. P and Jonathan Newton. 2009. Teaching ESL/EFL Listening 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 Niyi Osundare." 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
222PY1A1CA	PROPERTIES OF MATTER AND SOUND	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic principles, theory and concepts of Properties of Matter and Sound.
- The elastic properties of matter and the limits of elastic behavior.
- The nature and production of sound waves.

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 elastic modulus.	K2
CO2	Utilize the basic properties of matter and do the experiments in laboratory to evaluate the properties.	K2
CO3	Explain the basics of viscosity and compare it using different methods.	K3
CO4	Show experiments in explaining basics of sound waves using sonometer.	K2
CO5	Summarize the production, detection, properties and uses of ultrasonic waves.	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

222PY1A1CA	PROPERTIES OF MATTER AND SOUND	SEMESTER I

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Elasticity 14 h

Relation between angle of shear and linear strain - Work done in strain – Relation between the elastic moduli - Bending of beams – Expression for the bending moment - Determination of young's modulus by uniform bending method - Torsion of a body – Expression for torque per unit twist – Torsional oscillations of a body - Rigidity modulus by dynamic torsion method (Torsional pendulum).

Unit II Surface Tension 12 h

Molecular forces – Explanation of surface tension on kinetic theory – Work done in increasing area of a surface – Pressure difference across a liquid surface - Jaegar's method - Variation of surface tension with temperature - Experimental study of variation of surface tension with temperature.

Unit III Viscosity 12 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 – Modification of Poiseuille's formula for gases - Rankine's method for determination of η of a gas.

Unit IV Oscillation 11 h

Simple harmonic motion - Free vibration of a body - Damped vibration - Force vibrations - Saw tooth wave - Square wave - Composition of two simple harmonic motion in straight line - Lissajous figure - Experimental methods for obtaining Lissajous figure and uses.

Unit V Ultrasonics and Acoustics 11 h

Ultrasonics – Piezoelectric effect – Piezoelectric crystal method – Magnetostriction method – Applications - Acoustics of building – Sabine's Reverberation formula (No derivation) - Factors affecting acoustics of building - Sound distribution in an auditorium - Requisites for good acoustics.

Text Books

1 Murugeshan R, 2021, "Properties of matter", 3rd Edition, S. Chand & Co, New Delhi. (Unit 1, 2 & 5)

2 BrijLal and Subrahmanyam N, 2017, "Properties of Matter", 7th Edition, S. Chand and Co, New Delhi.

References

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

2 Gupta A. B, 2019, "Classical mechanics and properties of matter", 4th Edition, S. Chand & Co, New Delhi. (Unit 3 & 4)

3 Murugeshan R, 2016, "Properties Of Matter And Acoustic", 2nd Edition, Chand and Co, New Delhi.

4 Mathur D S, 2014," Elements of Properties of Matter", 3rd Edition, S. Chand and Co, New Delhi.

5 https://archive.nptel.ac.in/courses/105/105/105105177/

6 https://nptel.ac.in/courses/122105023

7 https://kanchiuniv.ac.in/coursematerials/Physics%20book_Final%20(1).pdf

Course Code	Course Name	Category	L	T	P	Credit
222PY1A1CB	MECHANICS	CORE	4	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The basic laws and principles of Newtonian mechanics.
- The central forces and conservative nature of central forces
- Apply the laws of mechanics in various application

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Summarize the concept of collisions and impact of Newton's law	K2
CO2	Utilize the principle of moment of inertia for experimental verification	K3
CO3	Illustrate the gravitational field and applications related to space	K2
CO4	Solve the problems in central force motions and interpret through derivational values	K3
CO5	Explain the concept of friction and demonstrate the importance of hydrodynamical functions	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

222PY1A1CB	MECHANICS	SEMESTER I

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Collisions 10 h

Collisions - Calculation of final velocities of colliding particle - Elastic collision in two or three dimensions - Collisions - Elastic one-dimensional collision - Impulse of a force - Value of the scattering angle - Impulse and linear momentum – Newton's law of impact - Co-efficient of restitution - Motion of two smooth bodies perpendicular to the line of impact - Definitions for direct and oblique impact.

Unit II Dynamics of Rigid Body 8 h

Moment of inertia – Theorems of perpendicular and parallel axes – Calculation of M.I for Rectangular, Cylindrical and Spherical Bodies – Compound pendulum – Theory – Determination of g and k.

Unit III Gravitation 11 h

Newton's law of gravitation – G by Boy's method – Acceleration due to gravity - Motion of a planet in an elliptical orbit around the sun - Mass and density of earth - Conservation of angular momentum of a system, a consequence of a rotational invariance of potential energy of the system - Motion of a planet or a satellite in its orbit – Applications: Scattering of a positive particle by a massive nucleus - Effect on linear and angular speeds of a particle on contraction of its orbit - The shape of the galaxy.

Unit IV Central Force Motion 9 h

Torque and angular acceleration – Acceleration of two objects connected by a cord - Acceleration of two connected objects when friction is present – Automobile Antilock Braking Systems (ABS) - Determination of motion of individual particle – System of variable mass.

Unit V Statics and Hydrodynamics 10 h

Friction - Laws of friction - Experimental method for determining coefficient of friction - Hydrodynamics - Equation of continuity of flow – Bernoulli's theorem and its applications - Venturi meter - Pitot tube.

Text Books

1 Mathur D S, 2014, "Mechanics", 4th Edition, S. Chand and Co., New Delhi

2 Halliday D, Resnick R and Walker J, 2011, "Fundamentals of Physics", 9th Edition, Wiley.

References

1 Duraipandian P, 2005, "Mechanics", 6th edition, S. Chand and Co., New Delhi

2 Murugesan P, 2014, "Properties of matter", S. Chand and Co., New Delhi

3 Charles Kittel, Walter Knight, Malvin Ruderman, Carl Helmholz, Burton Moyer, 2007, "Mechanics Berkeley Physics Course", Volume 1, Tata McGraw-Hill, New Delhi

4 Murugesan R, 2014, "Mechanics and Mathematical Physics", S. Chand and Co., New Delhi

5 https://www.youtube.com/watch?v=C1XuwHLacao

6 https://holooly.com/solutions/acceleration-of-two-connected-objects-when-friction-is-present-a-block-of-mass-m2-on-a-rough-horizontal-surface-is-connected-to-a-ball-of-mass-m1-by-a-lightweight-cord-over-a-lightweight-frictionles/

222PY1A1CP	CORE PRACTICAL: PROPERTIES OF MATTER AND MECHANICS	SEMESTER I

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Young's Modulus-Non-uniform Bending (Microscopic Method)
2	Young's Modulus-Uniform Bending (Microscopic Method)
3	Rigidity Modulus – Static Torsion
4	Study of the Rate of Flow of water through a Capillary Tube under different Pressure Heads.
5	To determine the Surface Tension of water by Drop Weight Method.
6	To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's Method).
7	To determine the Coefficient of Viscosity of the liquid by Stoke's Method
8	Sonometer – Frequency of a Tuning Fork
9	Determination of Rigidity modulus of a String
10	Determination of Moment of Inertia of a body.
11	Study of the Motion of a Freely Falling Body.
12	Compound Pendulum – Determination of 'g' and 'K'.
13	Young's Modulus – Koenig's method
14	Young's Modulus - Cantilever- Static Method
15	Young's Modulus - Cantilever - Dynamic Method

Note: Any 10 experiments

References

1 Ouseph C C, 2014, "Practical Physics and Electronics", Vishwanathan Publications, Chennai.

2 Samir kumarghosh, 2008, "Textbook of Advanced Practical Physics", NCBA publishers.

3 Chattopadhyay D, 2015, "Advanced Course in Practical Physics", NCBA Publications, Kolkata.

4 Arora C L, 2001, "B.Sc. Practical Physics", S. Chand and Co, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222MT1A1IP	FUNDAMENTALS OF MATHEMATICS WITH MATLAB	IDC	3	-	2	3

PREAMBLE

This course has been designed for students to learn and understand

- To promote new teaching model that will help to develop programming skills and technique to solve mathematical problems
- The applications of maxima and minima of functions
- The method of constructing definite integrals

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept of MATLAB	K2
CO2	Describe the vector and matrix	K2
CO3	Identify the maxima and minima of functions	K1
CO4	Describe first order and first degree Differential equations	K2
CO5	Compute the integral value by the integration by parts	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

222MT1A1IP	FUNDAMENTALS OF MATHEMATICS WITH MATLAB	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Creating Arrays 11 h

Creating a one dimensional array (vector) - Creating a two dimensional array (matrix) - Variables in Matlab - Transpose operator - Array addressing - Adding elements to existing variables - Deleting elements - Built in functions - Strings and strings as variables - Problems.

1 Creation of vector and matrix

2 Usage of zeros, ones and eye commands

3 Transposing a vector and matrix by transpose Operator

Unit II Mathematical Operations with Arrays 10 h

Addition and subtraction - Array multiplication - Array division - Element by element operations using arrays in Matlab - Built in functions for analyzing arrays - Generation of random numbers - Matlab applications.

4 Inverse of a Matrix

5 Built in functions for analyzing arrays

Unit III Differential Calculus 12 h

Maximum and minimum value of a function - Necessary conditions for extreme values - Sufficient condition - Use of second order derivative - Applications.

6 Derivative of symbolic expressions

7 Finding maxima and minima of a function t

Unit IV Differential equations of first order and first degree 14 h

Introduction - Separation of variables – Transformation of some equations in the form in which variables are separable – Homogeneous equations – Working rule – equations reducible to homogeneous form - Pfaffian differential equation - Exact differential equation – Necessary and sufficient condition for a differential equation of first order and first degree to be exact – Working rule – Solved examples.

8 Solve the Pfaffian differential equation

9 Solve the exact differential equation

Unit V Integral Calculus 13 h

Properties of definite integral - Integration by parts - Reduction formula - Bernoulli's formula.

10 Definite Integrals of Symbolic Expressions

11 Reduction formulas and Integration by parts

Text Books

1 Amos Gilat, 2007, "MATLAB An Introduction with Applications", Wiley India Pvt. Ltd., New Delhi.

2 Shanti Narayan, 2003, "Differential Calculus", Eleventh Edition, S. Chand and Company Limited, New Delhi.

3 Raisinghania M. D, 2012, "Ordinary and Partial Differential Equations", S. Chand & Co, New Delhi.

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

References

1 Narayanan S and Pillai T.K.M, 2003, "Calculus", Vol II, Viswanathan Publishers, Chennai

2 Shanti Narayan, 2003, "Integral Calculus", 11th Edition, S. Chand and Company Limited, New Delhi

3 RudraPratap, 2017, "Getting started with MATLAB, A Quick Introduction for Scientists and Engineers", 7th Edition, Oxford University Press, New York.

4 William J. Palm III, 2005, "Introduction to MATLAB for Engineers", The McGraw-Hill Companies, Inc., New York.

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.

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

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் 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

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B.Sc. Physics (Students admitted during the AY 2022-23)

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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

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Text Book

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

References

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

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

3 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY
வலைதள முகவரி : https://www.tamilvu.org

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

PREAMBLE

This course has been designed for students to learn and understand

- The writing ability and develop reading skill
- The various concepts and techniques for criticizing literature
- The techniques for expansion of ideas and translation process

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

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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

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

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

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	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

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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

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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

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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

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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
222PY1A2CA	HEAT AND THERMODYNAMICS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic principles, theory and concepts of heat and thermodynamics.
- The laws of thermodynamics, entropy, transmission and its properties.
- The thermometric, calorimetric theory and its applications.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Interpret kinetic theory of gases, its concepts and their applications.	K2
CO2	Compare the thermodynamic and statistical principles.	K2
CO3	Illustrate third law of thermodynamics and concepts of entropy.	K3
CO4	Analyze the phenomena of Thermometry and its measurement.	K4
CO5	Experiment with the specific heats of liquid and heat capacities.	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

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222PY1A2CA	HEAT AND THERMODYNAMICS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Kinetic Theory of Gases **9 h**

Concept of Ideal gas – Expression for pressure exerted on a Gas- Derivation of gas laws – Degrees of freedom - Maxwell's Law of Equipartition of energy – Relation between Molar Specific Heats and Degrees of Freedom - Van der waals equation of state: Correction for Pressure and Correction for Volume – Joule Kelvin effect: Temperature of Inversion.

Unit II Thermodynamics **10 h**

Zeroth Law of thermodynamics – Concept of heat - Internal Energy (U) - First law of thermodynamics – Specific heats of a gas – Adiabatic process - Isothermal process – Second law of thermodynamics – Carnot's Cycle- Concept of Entropy- Change in Entropy - Entropy of a perfect gas - Third law of thermodynamics.

Unit III Transmission of Heat **10 h**

Conduction - Coefficient of thermal conductivity – Rectilinear flow of heat along a bar - Forbes Method to find K – Cylindrical flow of heat - Thermal conductivity of rubber – Thermal conductivity of glass - Wiedemann-Franz law - Thermopile – Properties of thermal radiation.

Unit IV Thermometry **9 h**

Concept of heat and temperature – Types of thermometers – Relation between Celsius, Kelvin, Fahrenheit Scale of Temperatures - Platinum resistance thermometer – Callender and Griffith's bridge - Peltier effect – Low temperature measurement – High temperature measurement.

Unit V Calorimetry **10 h**

Newton's law of cooling – Specific heat of a liquid: Joule's Electrical method - Calendar and Barnes' continuous flow method – Experimental determination of heat capacities - Two specific heats of a gas – Specific heat of a gas by Joly's differential steam calorimeter.

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Text Books

1 Brij Lal, Subrahmanyam, 2014,"Heat Thermodynamics and Statistical Physics", 14th Edition, S Chand and Co, Delhi.

2 Mathur D.S, 2014, "Heat and Thermodynamics", S Chand and Co, Delhi.

References

1 Holman J.P, 2015, "Heat Transfer (IN SI UNITS)", McGraw Hill Education, New Delhi.

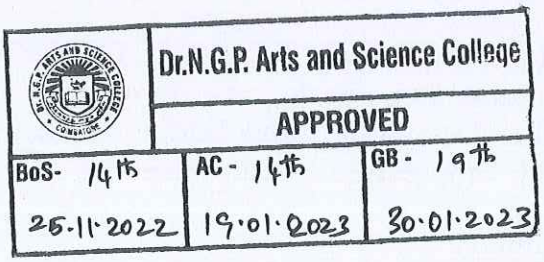
2 Kakani S.L, 2009, "Heat Thermodynamics and Statistical Physics",3rd Edition S Chand and Co, Delhi.

3 Murughesan R, 2014, "Thermal Physics", First Edition, S Chand and Co, Delhi.

4 Pramila Shukla, 2021, "Heat Thermodynamics", First Edition, Dreamtech Press, kindle eBook

5 Merzbacher E, 2011, "Quantum Mechanics", 3rd edition, John Wiley Interscience Publications

6 https://ncert.nic.in/textbook/pdf/keph204.pdf



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Course Code	Course Name	Category	L	T	P	Credit
222PY1A2CB	ATOMIC PHYSICS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of atomic physics with various atom models.
- The fine structure of atomic spectral lines.
- The properties of X-rays and photoelectric effect.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Establish the concepts of positive rays and mass spectroscopy.	K3
CO2	Identify the concepts of atomic models.	K2
CO3	Illustrate the fine structure of atomic spectral lines.	K3
CO4	Outline the concepts of X-ray and its properties.	K2
CO5	Interpret the concepts of photoelectric effect and its applications.	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

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222PY1A2CB	ATOMIC PHYSICS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I **Positive Rays and Mass Spectroscopy** **12 h**

Discovery – Properties of Positive Rays - Thomson's Parabola Method – Aston's Mass Spectrograph – Bainbridge's Mass Spectrograph - Dempster Mass Spectrograph - Mass Defect and Packing Fraction – Binding Energy.

Unit II **Structure of the Atom** **12 h**

Basic concept of Thomson's atom model - Bohr atom model - Bohr interpretation on hydrogen spectrum - Ritz combination principle - Sommerfeld's relativistic atom model - Vector atom model - Quantum numbers associated with vector atom model - Coupling schemes: L-S coupling - J-J coupling - The Pauli exclusion principle.

Unit III **Fine Structure of Spectral Lines** **12 h**

Critical potential - Atomic excitation - Experimental determination of critical potential: Franck and Hertz's method - Davis and Goucher's method. Optical spectra: Spectral terms - Spectral notation - Selection rules - Intensity rules - Interval rule - Normal Zeeman effect: Theory and experiment- Larmor's theorem- Anomalous Zeeman effect - Paschen-Back effect - Stark effect.

Unit IV **X-Rays** **12 h**

Production of X-Rays – Properties - Absorption of X-Rays – Laue experiment - Bragg's Law – Bragg's X-Ray spectrometer – X-Ray spectra - Characteristic X-Ray spectra - Moseley's law and its importance – Compton scattering: Theory and experiment.

Unit V **The Photoelectric Effect** **12 h**

Experimental investigation on the photoelectric effect - Einstein's photoelectric equation – Millikan's experiment - Photoelectric cell - Photo emissive cell - Photovoltaic cell – Photoconductive Cell - Application of photoelectric cell.

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Text Books

1 Murugesan R, 2014, "Modern Physics", 17th Edition, S. Chand & Co., New Delhi.

2 Aruldhas G, 2013, "Modern Physics", 1st Edition, Prentice Hall India Learning Private Limited, New Delhi.

References

1 Subrahmanyam N, 2014, "Atomic and Nuclear Physics", 1st Edition, S. Chand & Co, New Delhi.

2 Theraja B. L, 2014, "Modern Physics" 1st Edition, S. Chand & Co, New Delhi.

3 Sehgal N. K, 2013, "Modern Physics" 9th Edition, S. Chand & Co, New Delhi.

4 Basu C.C, 2015, "Atomic and Nuclear Physics" 1st Edition, NCBA, New Delhi.

5 https://www.youtube.com/watch?v=lUhJL7o6_cA.

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222PY1A2CP	CORE PRACTICAL II: HEAT AND THERMODYNAMICS	SEMESTER II

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Content
1	Determination of thermal conductivity of a bad conductor using Lee's disc method.
2	Calculation of the temperature coefficient of resistance of the given coil using Carey-Foster's bridge.
3	Determination of specific heat capacity of the liquid using Joule's calorimeter.
4	Study the V-I characteristics of a Thermistor.
5	Determination of semiconductor resistivity at different temperatures using Four Probe Method.
6	Determination of temperature coefficient of resistance of given wires using Post office box.
7	Study the variation of resistance with temperature using a Thermistor.
8	Determination of specific resistance of given coil of wire using Carey-Fosters bridge.
9	Determination of specific resistance of coil using Post office box method.
10	Determination of temperature coefficient of resistance for unknown resistors.
11	Determination of temperature coefficient of resistance for given copper strip.
12	Determination of band gap energy of a semiconductor using thermal method.

Note: Any 10 experiments

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References

1. Ouseph C C, 2014, "Practical Physics and Electronics", Vishwanathan Publications, Chennai.
2. Samirkumar Ghosh, Textbook of Advanced Practical Physics, NCBA Publishers.
3. Chattopadhyay. D, 2015, "Advanced Course in Practical Physics", NCBA Publications, Kolkata
4. Murughesan R, 2014, "Thermal Physics", S Chand and Co, New Delhi.

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Course Code	Course Name	Category	L	T	P	Credit
222MT1A2IP	STATISTICAL ANALYSIS AND TOOLS	IDC	3	-	2	4

PREAMBLE

This course has been designed for students to learn and understand

- The requirements of a good average and differentiate between average and dispersion
- Importance and the limitations of Correlation and Regression Analysis
- Analysis of Time Series

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Compute the various measures of central tendency	K1
CO2	Identify the measures of dispersion	K2
CO3	Explain the concepts of correlation	K1
CO4	Explain the concepts of regression	K2
CO5	Compute the component of time series	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

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222MT1A2IP	STATISTICAL ANALYSIS AND TOOLS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I **Measures of Central Tendency** **9 h**

Introduction - Arithmetic Mean - Median - Mode - Characteristics of Mean, Median and Mode - Geometric Mean - Harmonic Mean -Merits and Demerits of Mean, Median and Mode.

1 Calculate Mean

2 Calculate Geometric Mean and Harmonic Mean

3 Calculate Median

4 Calculate Mode.

Unit II **Measures of Dispersion** **9 h**

Introduction - Range - Interquartile Range - Mean Deviation -Coefficient of Mean Deviation - Standard Deviation.

5 Determine Range

6 Determine Interquartile Range

7 Determine Mean Deviation

8 Determine Standard Deviation.

Unit III Correlation 14 h

Introduction - Types of Correlation - Karl Pearson's Coefficient of Correlation - Properties - Merits and Demerits - Rank Coefficient of Correlation.

9 Determine Correlation using Pearson method

10 Determine rank correlation for the given data

11 Determine rank correlation for repeated data.

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Unit IV Regression 14 h

Introduction - Definition - Uses - Method of studying Regression - Graphic Method - Algebraic Method - Regression Line - Regression Equation.

12 Determine regression line using Graphic Method

13 Determine regression line using Algebraic Method

14 Determine regression equation.

Unit V Analysis of Time Series 14 h

Meaning - uses - Secular Trend - Seasonal variation - Cyclical variation - Irregular variation - Measurement of Secular Trend - Graphic Method - Semi average Method - Moving average Method - Method of least squares.

15 Determine a Trend line using Semi average Method

16 Determine a Trend line using Moving average Method

17 Determine polynomial using method of Least Square Curve Fitting.

Text Books

1 Pillai R.S.N and Bagavathi V, 2017, "Statistics", 14th Edition, S. Chand and Company Ltd, New Delhi.

2 Dr.Bharti Motwani, 2021,"Data Analytics with R", Wiley India pvt. Ltd, New Delhi .

References

1 Gupta S.P, 2014, "Statistical Methods", 34th Edition, Sultanchand and sons Educational Publishers, New Delhi.

2 Ken Black, 2009, "Business Statistics for Contemporary Decision Making", John Wiley and sons Pvt. Ltd, New Delhi.

3 Beri G C, 2010, "Business Statistics", Second Edition, Tata McGraw- Hill Pvt Ltd, New Delhi.

4 Sancheti. D.C and Kapoor V.K, 2010, "Statistics", Seventh Edition, S. Chand and Company Ltd, New Delhi.

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221TL1A2AA	BASIC TAMIL	SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

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.

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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. வலைதள முகவரி : https://www.tamilvu.org.

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BoS- 16th 25.11.2022	AC - 16th 19.01.2023	GB - 19th 30.01.2023

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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

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

Unit II கட்டுரை 05 h

கட்டுரைத் தொகுப்பு - நல்வாழ்வு - டாக்டர் மு.வரதராசன்

1. நம்பிக்கை
2. புலனடக்கம்
3. பண்பாடு

Unit III இலக்கணம் 04 h

1.வல்லினம் மிகும் மற்றும் மிகா இடங்கள்

2. ர ,ற,ல,ழ,ள,ந,ண,ன – வேறுபாடு அறிதல்

Unit IV கடிதங்கள் 05 h

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

Unit V பயிற்சிப் பகுதி 04 h

படைப்பாக்கப் பகுதி

பொதுத் தலைப்புகளில் கவிதை , கட்டுரை எழுதச் செய்தல்

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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

- The concepts of Human Rights.
- The human Right Violations and Redressal Mechanism.
- The 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	Describe the Fundamental Rights	K2
CO3	Relate Human Right Violations and Redressal Mechanism.	K3
CO4	State the Rights to Women and Child	K2
CO5	Apply 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

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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**

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.

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Text Books

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

References

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

25.11.2022

BoS Chairman/HoD
Department of Physics
Dr. N. G. P. Arts and Science College
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BoS- 14th	AC - 14th	GB - 19th
25.11.2022	19.01.2023	30.01.2023

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

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத்திறன்கள் (Life Skills) - மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K2
CO4	சூழலியல் ஆக்கம் (Ecology)	K3
CO5	மொழி அறிவு(Tamil knowledge)	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

221TL1A3TA	TAMIL - III	SEMESTER III

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)

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

PREAMBLE

This course has been designed for students to learn and understand

- The writing ability and develop reading skill
- The various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- The competency in translating simple Malayalam sentences into English and vice versa

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUS ON

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

221TL1A3MA	MALAYALAM - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Poetry** 10 h

Kumaranasan

Unit II **Poetry** 10 h

Kumaranasan

Unit III **Poetry** 10 h

Kumaranasan

Unit IV **Poetry** 10 h

Vayalar Ramavarma

Unit V **Poetry** 08 h

Vayalar Ramavarma

Text Books

1 Kumaranasan. 1998. Chinthavishtayaya Sitha. DC Books Kottayam, Kerala, India. (Unit I to III)

2 Ayisha (Poem), National Book Stall Kottayam, Kerala, India. (Unit IV & V)

Reference

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

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

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓	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)

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
222PY1A3CA	ELECTRICITY AND MAGNETISM	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The principles, theories and concepts of electricity and magnetism.
- The concepts of thermoelectricity and electrical conductivity.
- The concept of Maxwell's equation andelectromagnetic waves.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the magnetic flux through Biot-savart law andgalvanometer.	K2
CO2	Contrast the thermal and chemical effect of electric current.	K2
CO3	Apply the laws and concept of electromagneticinduction.	K3
CO4	Make use of the LCR in AC circuits.	K3
CO5	Outline the wave equations in electric and magneticfield.	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

222PY1A3CA	ELECTRICITY AND MAGNETISM	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Magnetic Effect of Electric Current 10 h

Magnetic field - Magnetic flux - Biot Savart law - Helmholtz tangent Galvanometer: construction and theory - Magnetic induction at any point on the axis of a solenoid -Method of images and its application to: (1) plane infinite sheet and (2) sphere - Force on a current carrying conductor in a magnetic field - Moving coil ballistic galvanometer: construction and theory.

Unit II Thermoelectricity and Chemical Effect of Electric Current 10 h

Seebeck effect - Laws of thermo E.M.F - Measurement of thermo E.M.F using potentiometer - Peltier effect S.G. starling method - Thomson effect and coefficient- Thermo electric diagram – electrical conductivity of an electrolyte – Kohlrausch's bridge method of determining the specific conductivity of an electrolyte – Arrhenius theory of electrolytic dissociation.

Unit III Electromagnetic Induction 10 h

Faraday's laws of electromagnetic induction - Faraday's laws of electromagnetic induction in vector form - Self-inductance of a long solenoid – Determination of self-inductance (L) by Rayleigh's methods - Mutual induction - Mutual inductance between two co-axial solenoids – Experimental determination of mutual inductance - Ruhmkorff's induction coil.

Unit IV Electromagnetic Waves 10 h

Alternating current - J operator method – LCR series resonance circuit – Parallel resonant circuit - Comparison between series and parallel resonant circuits - Wattless current - A.C. circuit containing resistance only - Inductance only - Capacitance only - Capacitance and resistance in series - Parallel resonant circuit- A.C. watt meter.

Unit V Maxwell's Equation and Electromagnetic Waves 8 h

Basic laws - Maxwell's equations - Maxwell's correction in ampere's law - Displacement current - Poynting vector - Maxwell's equations for electric and magnetic properties - Monochromatic plane waves in vacuum - Energy and momentum of electromagnetic wave

Text Books

1 Murugeshan R, 2012, "Electricity and Magnetism", 6th Edition, S. Chand &Co, New Delhi.

2 Sehgal, Chopra, Sehgal, 2013, "Electricity and Magnetism", 6th Edition, Sultan Chand & Sons, New Delhi.

References

1 Chattopadhyan D, Rakshit P.C, 2011, "Electricity and Magnetism", 3rd Edition, New central book agency, London.

2 D.C. Tayal, 2019, "Electricity and Magnetism", Himalaya Publishing Co, NewDelhi.

3 Satya Prakash, 2013, "Electricity and Magnetism", 2nd Edition, PragatiPrakashan, Delhi.

4 Ashutosh Pramanik, 2012, "Electromagnetism problems with solutions", 3rd Edition. PHI Learning Private Limited, Delhi.

5 https://eng.libretexts.org/Bookshelves/Electrical_Engineering/ElectroOptics/Electromagnetic_Field_Theory%3A_A_Problem_Solving_Approach_(Zahn)/02%3A_The_Electric_Field/2.07%3A_The_Method_of_Images_with_Point_Charges_and_Spheres

6 http://www.pas.rochester.edu/~stte/phy415F20/units/unit_1-3.pdf

Course Code	Course Name	Category	L	T	P	Credit
222PY1A3CB	CORE:NUCLEAR PHYSICS	CORE	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The properties of nucleus and nuclear model.
- The reaction of nuclear reactors and particle accelerators.
- The radioactivity nature, nuclear reactions, and elementary particles.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Interpret the basic properties of nucleus	K2
CO2	Explain the principle of detector and accelerators	K2
CO3	Apply the fundamentals of radioactivity	K3
CO4	Develop knowledge of nuclear energy, fission, and fusion.	K3
CO5	Summarize the concept of elementary particle and cosmic rays	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

222PY1A3CB	CORE:NUCLEAR PHYSICS	SEMESTER III

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I **Introduction on Nucleus** 7 h

Introduction – Classification of nuclei – General properties of nucleus -Binding energy- Nuclear stability- Theory of nuclear composition-Liquid drop model- Semi-empirical mass formula-The shell model- Evidence for shell model -Prediction of the shell model-Collective model.

Unit II **Detectors of Nuclear Radiation and Particle Accelerators** 7 h

Interaction between energetic particles and matter – Ionization chamber -Geiger Muller counter-Wilson cloud chamber -Bubble chamber- Radiation hazards-Cyclotron-Synchrocyclotron-Betatron-Magic numbers.

Unit III **Theory of Radioactivity** 7 h

Natural radioactivity - Properties of alpha, beta, gamma rays - Geiger Nuttal law - nuclear isomerism - Soddy Fajan's displacement law - Law of radioactive disintegration - Half life - Mean life - Unit of radioactivity - Law of successive disintegration – Radioactive dating - The age of the earth.

Unit IV **Nuclear Fusion and Fission** 7 h

Nuclear fusion- Energy released in fission –Bohr and Wheelers theory of nuclear fission -Nuclear chain reaction - Atom bomb-Nuclear reactor-Use of nuclear reactor-Nuclear fusion - Source of stellar energy - Thermonuclear reactions - Hydrogen bomb.

Unit V **Elementary Particle and Cosmic Rays** 8 h

Classification of elementary particles - Fundamental interactions - Elementary particles - Quantum numbers - Conservation laws and symmetry - Quark model - Type of quarks - Primary cosmic rays - Secondary cosmic rays - Cosmic ray showers -Van Allen belt - Origin of cosmic rays.

Text Books

1 Murugeshan. R, Kiruthiga .S, 2005 , "Modern Physics" 18th Edition, S.Chand & Co, New Delhi.

2 Subrahmanyam N, 2014, "Atomic and Nuclear Physics", 1st Edition, S.Chand & Co, New Delhi.

References

1 Theraja. B. L, 2014, "Modern Physics" 1st Edition, S.Chand& Co, New Delhi.

2 Sehgal. N. K, 2013, "Modern Physics" 9th Edition, S.Chand& Co, New Delhi.

3 Aruldhas G, 2013, "Modern Physics", 1st Edition, Prentice Hall India Learning Private Limited., New Delhi.

4 Basu C.C, 2015, "Atomic and Nuclear Physics" 1st Edition, NCBA, New Delhi..

5 D.C.Tayal,2011 Nuclear Physics, Himalaya Publishing House, New Delhi.

6 M.L. Pandya and R.P.S. Yadav,2015, Elements of Nuclear Physics, KNRN Publication, New Delhi..

7 https://www.youtube.com/watch?v=lUhJL7o6_cA

222PY1A3CP	CORE PRACTICAL-III: ELECTRICITY AND MAGNETISM	SEMESTER III

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Determination of M and H -deflection magnetometer.
2	Find the magnetic field along the axis of a circular coil carrying current
3	Find the moment of magnet – tan c position
4	Calibration of low range voltmeter - ballistic galvanometer
5	Determine the angle and refractive index of prime – (I-D) curve. (Under DBT Star College Scheme)
6	Calculate the moment of magnet – Tan A position
7	Determination of wavelength and particle size - LASER source of He-Ne. (Under DBT Star College Scheme)
8	Calculate the low resistance using Carey Foster's bridge.
9	Determine the low range voltmeter calibration using potentiometer
10	Comparison of emf's of two coils using ballistic galvanometer.
11	Determine the ammeter calibration by using potentiometer.
12	Calculate the B and M by magnetic hysteresis loop tracer equipment. (Under DBT Star College Scheme)

Note: Any 10 experiments

References

1 Ouseph. C C, 2014, "Practical Physics and Electronics", Vishwanathan Publications, Chennai.

2 Samir Kumar Ghosh. Textbook of Advanced Practical Physics, NCBA publishers.

3 Chattopadhyay.D, 2015, "Advanced Course in Practical Physics",NCBA publications, Kolkata.

4 Murughesan R, 2014, "Thermal Physics", S Chand and Co, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
222CE1A3IP	CHEMISTRY-I	IDC	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- About the solutions and volumetric analysis.
- The types, method of preparation of polymers
- The adsorption process, acid and bases.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the making of solution and principles of volumetric analysis	K2
CO2	Explain the preparation an properties of simple polymers	K2
CO3	Infer the properties and preparation of organic compounds	K3
CO4	Relate the various adsorption process	K2
CO5	Examine the Solubility and concept of acid and bases	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

222CE1A3IP	CHEMISTRY-I	SEMESTER III

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Solutions 12 h

Normality, molarity, molality, mole fraction, mole concept. Primary and secondary standards – Preparation of standard solutions. Principle of Volumetric analysis (with simple problems). Indicators – Theory of indicators.

1 Estimation of Sodium hydroxide using HCl

2 Estimation of Ferrous sulphate.

Unit II Polymer Chemistry 12 h

Introduction – Mechanism of polymerisation- Types of polymerization – Addition, Condensation and Copolymerization - Plastics - Compounding of plastics. Preparation, properties and uses of cellulose nitrate, cellulose acetate, PVC, PVA, Nylon -66, PET, PAN. Conducting polymers.

3 Determination of molecular weight of polymer by using viscometer

4 Preparation of polystyrene

Unit III Basic Organic Chemistry 12 h

Structure, Nomenclature, preparation and properties of Carboxylic acids, Phenols, Amides, Amines and Carbohydrates

5 Identification of simple organic Compounds-I

6 Identification of simple organic Compounds-II

7 Identification of simple organic Compounds-II

Unit IV Adsorption 12 h

Adsorption- Physisorption and Chemisorption - Factors influencing adsorption of gases on solids - Langmuir adsorption isotherm

8 Verification of Frendlich Adsorption isotherm of oxalic acid

9 Verification of Frendlich Adsorption isotherm of acetic acid

Unit V Solubility Product and Acids and Bases 12 h

Solubility and ionic equilibria, solubility product, applications of solubility product. Acids - bases, Arrhenius, Bronsted- Lowry and Lewis concepts and relative strength of acids and bases, pH scale.

10 Determination of solubility product constant of Silver acetate

11 Determination of Equivalent conductance at infinite dilution of strong electrolyte

12 Determination of Equivalent conductance at infinite dilution of weak electrolyte

Note:

Text Books

1 Puri. B.R, Sharma. L.R and Pathania. M.S, 2017, "Principles of Physical Chemistry", 47th Edition, John Wiley and Sons & USA.

2 Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA

References

1 Lee. J.D, 2002, "A New Concise Inorganic Chemistry", 5th Edition, ELBS & UK

2 Jain. M.K and Sharma. S.C, 2012, "Modern Organic Chemistry", Vishal publishing Co & New Delhi

3 Puri. B.R, Sharma. L.R and Kalia. K.C, 2016, "Principles of Inorganic Chemistry", Vishal Publishing & Co & New Delhi

4 Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017, "Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons & New Delhi.

5 https://instruct.uwo.ca/chemistry/020inter/SolubilityProductNotes.pdf

6 https://www.chem.uwec.edu/chem101_s01/pages/Lecturenotes/C101_notes07.pdf

Course Code	Course Name	Category	L	T	P	Credit
222PY1A3SP	BASIC COMPUTER SKILLS	SEC	2	-	2	2

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of world wide web
- The basics concepts of HTML and designing using HTML
- The skills to develop frames and handle table

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge on world wide web	K2
CO2	Learn about basics of HTML	K3
CO3	Design using HTML	K2
CO4	Develops frames and ordered lists	K2
CO5	Create table using HTML and handle the table	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

222PY1A3SP	SEC PRACTICAL: BASIC COMPUTER SKILLS	SEMESTER III

Total Credits: 2

Total Instruction Hours: 36 h

Syllabus

Unit I World Wide Web 6 h

Internet Principles – Basic web concepts – Client/server model – Retrieving data from internet –Internet –Protocols and applications.

Unit II Introduction to HTML 7 h

History of HTML - HTML generations, documents - Anchor tag - Hyper links - Header section - Title, prologue, links - Colorful webpage - Comment lines.

1 Create a web page which displays the wage of style attributes and event function with demo.

2 Create a web page which receives suggestions from customers for a software development and consultancy agency using necessary functions.

Unit III Designing The Body Section 8 h

Heading printing - Aligning the headings - Horizontal rule - Paragraph - Tab settings - Images and pictures - Embedding PNG format images.

3 Create a web page with necessary formats, images and marquees.

4 Create a web page which displays the mouse co–ordinates and image co–ordinates.

Unit IV Ordered, Unordered Lists and Frames 8 h

Lists - Unordered lists - Heading in a list - Ordered lists - Nested lists - Frames: Frameset definition, frame definition - Nested framesets.

5 Create a web page with lists (ordered, unordered and definition lists.

6 Using frames, create web page for a travel agency

Unit V Table Handling 7 h

Table creation – Table creation in html – Width of the table and cells - Cell spanning multiple rows/columns - Coloring cells - Column specification

7 Create a web page with table content.

8 Create a web page site using links for text and images

Note:

Text Books

1 Xavier.C, "World Wide Web design with HTML", Tata McGraw Hill Publishing Limited, New Delhi.

2 Gopalan N.P. and Akilandeswari J., 2011, "Web Technology", Prentice Hall of India.

References

1 Deitel H.M. and Deitel P.J., 2012, "Internet and World Wide Web: How to program", 4th Edition, Pearson International,

2 https://www.washington.edu/accesscomputing/webd2/student/unit1/module3/html_history.html

3 https://www.tutorialspoint.com/html/html_images.htm

4 https://www.w3schools.com/html/html_links.asp

222PY1ASSA	SELF STUDY: ELECTRICAL AND ELECTRONIC APPLIANCES	SEMESTER III

Total Credits: 1

Total Instruction Hours: h

Syllabus

Unit I Basic Electrical Instruments and Units

Galvanometer-Ammeter-Voltmeter- Multimeter- Transformers -Voltage-Current, Resistance-Capacitance-Inductance-Electrical conductors and insulators.

Unit II Electrical Safety Measurement

Electric Shock- First aid for electric shock- Overloading -Earthing and its necessity- Short circuiting- Fuses, MCB, ELCB, insulation, inverter, UPS.

Unit III Home Appliances

Principles and working: electric fan-Electric iron box-Water heater- Induction heater- Microwave oven- Refrigerator.

Unit IV Household Wirings

House Hold Wiring – Short circuit protection – Current consumption of household appliances – Power distribution – AC load – DC load - Advantages and limitations of DC load.

Unit V Electrical Machines

D.C. Motor: working, principle, and construction- Single phase A.C. motor : working, principle, and construction - Rewinding-Maintenance.

Text Books

1 B.L.Theraja, (2019), Basic Electronics,S.Chand & Co., New Delhi.

2 K. C. Agrawal, (2020), Industrial Power Engineering and Applications Hand Book, Newnes publications.

References

1 K.B. Bhatia (2019) Study of Electrical Appliances & Devices, Khanna Publications.

2 K.P.Anwar, (2020) Domestic Appliances Servicing, Scholar Institute Publications..

3 S. P. Bali, (2017) Consumer Electronics-Pearson Education.

4 Sing S. N, (2010), Basic Electrical Engineering, PHI Learning Pvt. Ltd.

5 Albert Malvino, David J. Bates (2007) "Electronic Principles", Tata McGraw Hill.

222PY1ASSB	SELF STUDY: BIOPHYSICS	SEMESTER III

Total Credits: 1

Syllabus

Unit I Introduction To Biophysics

Methods of biophysics-scope of biophysics- Primary bonds -Secondary bonds-Ionic bonds, covalent bonds-Metallic bonds- van der Waals bonds-Hydrogen bond.

Unit II Centrifugation In Biological Studies

Introduction -Ordinary centrifugation-Types of centrifugations-Differential centrifugation -Ultracentrifugation; principle-Application.

Unit III Principle of Optics in Biological Studies

Introduction -Optical microscope-Ultraviolet microscope- Transmission electron microscope-Scanning electron microscope

Unit IV Radiation Physics In Biology

Introduction-Radioactive isotopes-Radioactivity-Effects of radiation on biological system-Beneficial effects of radiation-Radiation dosimetry.

Unit V Principle of Kinetics of Molecules

Diffusion-Factors affecting diffusion biological significance of diffusion -Osmosis - Osmatic pressure-Biological significance of osmosis

Text Books

1 Arumugam N. and Kumaresan V M, 2013, "Biophysics and Bioinstrumentation", Saras Publications. Unit I-IV

2 Subramanian M.A, 2006, "Biophysics: Principles and Techniques" MJP Publishers, Chennai. Unit V

References

1. Khandpur R.S., 2014, " Handbook of Biomedical instrumentation", TMH Publication Ltd.
2. Murugesan, R, 2003, "Modern Physics", 11th Edition, S. Chand & Company Ltd, New Delhi.
3. Pattabhi, V. and Gowtham, 2011, 2nd Edition "Biophysics", Narosa Publishing House, New Delh.
4. Daniel M., 1998, "Basic Biophysics for Biologist", Agro-bios, Jodhpur.

12/6/2023

BoS Chairman/HoD
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Dr. N. G. P. Arts and Science College
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Dr.N.G.P. Arts and Science College		
APPROVED		
15th	AC - 15th	GB - 20th
12.6.23	14.7.23	5.8.23

Academic Council · CHAIRMAN · 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 छोड़कर) 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

ExprimerPaccord ou 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. Raconter unsourvenir.

Unit III 10 h

° Parler de 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. ° Décrirequelqu'un	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 : Regine Mérieux, 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
222PY1A4CA	OPTICS AND SPECTROSCOPY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concept of geometrical optics and defects of lenses
- The behavior of light and their applications.
- The basic of molecular spectroscopy and their applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify the aberrations and explain the dispersive power of prism	K2
CO2	Interpret the importance of pattern forms and interferometers	K3
CO3	Demonstrate the Fresnel, Fraunhofer diffraction and Resolving power	K3
CO4	Analyze the plane, circularly and elliptically polarized light	K4
CO5	Apply the principle of spectroscopy for their applications.	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

222PY1A4CA	OPTICS AND SPECTROSCOPY	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Geometrical optics **9 h**

Aberrations - Spherical aberrations in lens - Methods of minimizing spherical aberration - Coma - Astigmatism - Chromatic aberration - Expression for an object at infinity - Achromatic lens - Condition for achromatism of two thin lenses separated by a finite distance - Dispersion by a prism - Angular dispersion and dispersive power.

Unit II Interference **10 h**

Interference in thin films due to reflected and transmitted light – Fringes produced by a wedge-shaped thin film – Refractive index of the liquid in Newton`s ring – Michelson interferometer – Measurement of wavelength, difference in the wavelength of two waves of Michelson interferometer – Fabry-Perot interferometer - Application of interference - Fresnel biprism.

Unit III Diffraction **10 h**

Fresnel's assumptions - Rectilinear propagation of light - Half period zone - Zone plates - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction at double slit - Theory of plane diffraction grating - Paschen mounting - Resolving power - Rayleigh`s criterion - Resolving power of telescope, prism, and grating.

Unit IV Polarization **10 h**

Brewster's law - Huygen's explanation of double refraction - Production and detection of linear polarized light - Quarter wave plate and half wave plate - Production and detection of elliptical, circular polarized light - Application of polarized light - Optical activity - Optical rotation - Specific rotation - Fresnel's explanation - Laurent's half shade polarimeter.

Unit V Spectroscopy **9 h**

Origin of pure rotational spectrum of a molecule - Theory of the origin of vibration, rotation spectrum of a molecule - Electronic spectra of molecules - Experimental study of Raman effect - Quantum theory of Raman effect – Application of Raman spectra.

Text Books

1 Brij Lal and Subrahmanyam N, 2014, "A Textbook of Optics", S. Chand and Co., New Delhi.

2 Murugeshan R and Kiruthiga Sivaprasath E, 2014, "Modern Physics", S. Chand and Co., New Delhi.

References

1 David W Ball, 2013, "Basics of Spectroscopy", PHI Pvt. Ltd., New Delhi.

2 Murugesan R, 2014, "Optics and Spectroscopy", S. Chand and Co., New Delhi.

3 Aruldhas G, 2007, Molecular structure and spectroscopy. PHI Pvt. Ltd, II Edition, New Delhi.

4 Ajoy Ghatak, 2006, "Optics", 3rd Edition, Tata McGraw Hill Publishing Company Ltd., New York.

5 https://www.youtube.com/watch?v=RZOtVmFgMlA

Course Code	Course Name	Category	L	T	P	Credit
222PY1A4CB	PRINCIPLES OF ELECTRONICS AND COMMUNICATION	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The electronics components of diode, transistor and IC's
- The modulation, demodulation and transmitter, receiver
- The various communication types and their applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the concept of special diodes and transistor	K2
CO2	Illustrate the various types and importance of transistor and IC's	K3
CO3	Interpret the concept of AM, and FM	K3
CO4	Outline the definite receiver and the signal noise ratio	K4
CO5	Connect the concept of satellite communication, radar and fiber optics communications.	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

222PY1A4CB	PRINCIPLES OF ELECTRONICS AND COMMUNICATION	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Diodes and Transistors** 10 **h**

PN Junction diode - Zener diode - Tunnel diode - Light emitting diode - Photo diode - Shockley diode. Transistor: symbols, terminals, facts, and actions - Characteristics of CB, CE and CE - Transistor testing.

Unit II **Types of Transistors** and **IC's** 10 **h**

Principle, symbol and working of JFET - Output characteristics of JFET - MOSFET types and symbols - Circuit operations of D MOSFET, E MOSFET - Characteristics of UJT. IC's symbols, packing's, classifications - Making monolithic IC- Advantage and disadvantage of IC's.

Unit III **Modulations** and **Demodulations** 09 **h**

Modulation – Necessity for modulation – Types of modulation - Modulation factor – Frequency spectra - Representation of AM – Representation of FM - Demodulation - Essentials in demodulation.

Unit IV **AM Transmitter and Receiver** 09 **h**

AM detector - AM receiver - Types of AM receiver - TRF receiver – Superheterodyne receiver – Image frequency rejection – S/N ratio – Sensitivity – Selectivity – RF amplifier – Mixer – Detection and AGC.

Unit V **Communication Types** 10 **h**

Communication – Components of a communication system – Satellite communication fundamentals – Up Link – Down Link – RADAR: Principle, Transmitting and reception systems – Applications - Fiber Optics: Principle, Structure, Acceptance Angle, Numerical Aperture.

Text Books

1 Mehta V.K, Rohit Mehta, 2014, "Principles of Electronics", S. Chand Publications, New Delhi.

2 Wayne Tomasi, 2012, "Electronic Communication Systems", 5th Edition. Pearson Education, New Delhi.

References

1 Robert J. Schoenbeck, 1992, "Electronic communication, Modulation and Transmission", Universal Book Stall, New Delhi.

2 George Kennedy, 2006, "Electronic Communication Systems", 4th Edition, Tata McGraw Hill, New Delhi.

3 Anokh Singh, 1999, "Principles of Communication Engineering" S.Chand & Co. Delhi.

4 Despande N.D. et. al., 2004, "Communication Electronics", Tat McGraw Hill, New Delhi.

5 E-Book: Dennis Roddy and John Coolen, 1995, "Electronic Communication", 4th Edition, Prentice Hall Career and Technology, New Delhi.

222PY1A4CP	CORE PRACTICAL: OPTICS AND SPECTROSCOPY	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
1	Determination of the wavelength of sodium light and the number of lines per centimeter using diffraction grating
2	Determination of dispersive power and resolving power using plane diffraction grating. (Under DBT Scheme)
3	Find the thickness of a thin paper by measuring the width of interference fringes produced by a wedge-shaped Film
4	Determination of the refractive index of a prism using (i-i′) curve
5	Determination of the radius of curvature of lens using Newton's Rings.
6	Determine the wavelength of a source using Michealson's interferometer. (Under DBT Scheme)
7	Determination of the resolving power of the material of a prism using mercury source.
8	Find the values of the Cauchy constants of the material of a prism using mercury source.
9	Comparison of the Refractive indices of two different liquids using hollow prism.
10	Determination of the Refractive index of water using hollow prism.
11	Determination of the wavelength of sodium light using Newton's Rings.
12	Determine the dispersive power of the material of a prism using mercury Source. (Under DBT Scheme)

Note: Any 10 Experiments

References

1 Chattopadhyay D, 2015, "Advanced course in Practical Physics", 8th Edition, NCBA publishers, Kolkata.

2 Samir Kumar Ghosh, 2013, "Textbook of Advanced Practical Physics", NCBA Publishers, Kolkata.

3 Arora C.L, 2013, "B.Sc. Practical Physics", S. Chand and Company Limited, New Delhi.

4 Ouseph C.C, 2014, "Practical Physics and Electronics", Viswanathan publishers, Chennai.

Course Code	Course Name	Category	L	T	P	Credit
222CE1A4EP	CHEMISTRY - II	IDC	3	-	4	5

PREAMBLE

This course has been designed for students to learn and understand

- The basic knowledge about conductance and electrolytic cells
- The classification of the electrodes
- About the qualitative and gravimetric analysis

COURSE OUTCOMES

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

CO Numbers	CO Statement	Knowledge Level
CO1	Explain the types of conductance and electrolytic cells	K2
CO2	Outline the types of electrodes	K2
CO3	Relate the one and two component systems	K2
CO4	Examine the qualitative analysis in inorganic salt mixture	K3
CO5	Infer the various types of precipitation methods	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

222CE1A4EP	CHEMISTRY - II	SEMESTER IV

Total Credits: 5

Total Instruction Hours: 72 h

Syllabus

Unit I Electrochemistry - I 14 h

Types of conductance - Electrolytic, specific, molar, equivalent - Cell constant - Ionic mobility - Transport number. Half reactions - Oxidation and reduction, electrochemical cells - Galvanic and electrolytic cells - Reversible cells.

Practical

1 Determination of strength of strong acid using Conductometer

2 Determination of strength of mixture of acids using Conductometer

Unit II Electrochemistry - II 14 h

Electrochemical series - Single electrode potential - Types of electrodes - Calomel electrode, standard hydrogen electrode, Ag/AgCl electrode - EMF cell representation – EMF and free energy.

Practical

3 Determination of strength of iron using potentiometer

4 Determination of strength of strong acid using potentiometer

Unit III Phase Rule 14 h

Introduction, degrees of Freedom, phase reactions, conditions for equilibrium - Derivation of phase rule - One and two component system

Practical

5 Determination of critical solution temperature using phenol water system

6 Determination of transition temperature using naphthalene - biphenyl system

Unit IV Qualitative Analysis 15 h

Introduction - Dry reactions – Heating, flame tests; Wet reactions – Test tubes, centrifuge tube, centrifugation, washing the precipitates through Buckner funnel - Sintered crucible, precipitation with hydrogen sulphide, interfering anions and its elimination - Classification of cations into analytical groups (group separation only

Practical

7 Qualitative analysis of Inorganic salt - I

Course Code	Course Name	Category	L	T	P	Credit
222PY1A4SA	CONCEPTS AND PROGRAMMING IN C	SEC	3	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The basic principles of programming.
- The concepts of C Programming language.
- The usage of C program into Physics problems.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Illustrate the fundamentals of C programming.	K2
CO2	Understand the strength of C through its rich set of operators.	K2
CO3	Apply the knowledge of control structure as decision making and looping.	K3
CO4	Build programs using arrays and functions.	K3
CO5	Analyze the concepts of C programming in Physics problem solving.	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

222PY1A4SA	CONCEPTS AND PROGRAMMING IN C	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 36 h

Syllabus

Unit I **Basic Structure of C Programming** **7 h**

Character sets - Constants - Keywords and identifiers - Variables - Data types - Declaration of variables - Assigning values to variables - Defining symbolic constants.

Unit II **Operators and Expression** **7 h**

Arithmetic operators - Relational operators - Logical operators - Assignment operators - Increment and decrement operators - Conditional operators - Special operators - Arithmetic expression - Evaluation of expression - Precedence of arithmetic operators - Some computer problems - Type conversion in expression - Operator precedence and associatively - Mathematical functions.

Unit III **Control statements** **7 h**

Reading and writing character - Formatted input and output - Decision making: IF statement: Simple IF - IF ELSE - Nesting of IF ELSE, ELSE - IF Ladder - Switch statement - Operator - Go to statement - While - Do While - For loop - Jumps in loops - Simple programs.

Unit IV **Arrays** **7 h**

One dimensional array - Declaration of array - Initiating on two and multidimensional arrays - Declaring and initializing string variables - Reading strings from terminal - Writing strings on the screen - Arithmetic operations on characters - Simple programs - Sorting, searching program using one dimensional array, matrix manipulation.

Unit V **Physics Problems into C programming** **8 h**

Conversion of temperature from C to F and F to C - Determination of velocity of light by Foucault's rotating mirror method - Determination of G by Boy's Method - Young's modulus - Uniform and Non-Uniform method - Determination of frequency: Sonometer - Spectrometer: refractive index and Dispersive power of Prism - Newton's rings: radius of curvature.

Text Books

1 Balagurusamy E, 2012, "Programming in ANSI C", 6th Edition, Tata McGraw Hill Publishing Company Ltd, New York.

2 Yaswanth Kanitkar, 2012, "Let Us C", 13th Edition, BPB Publication, New Delhi.

References

1 Karthikeyan E, 2008, "A Textbook on C", Prentice Hall India, New Delhi.

2 Palaniswamy S, 2004, "Physics Through C Programming", Pragati Publication, Meerut.

3 Ashok N. Kamthane, 2011, "Programming in C", 2nd Edition, Pearson Education, Chennai.

4 Gotfried B, 2010, "Programming with C", 3rd Edition, Tata McGraw Hill Publishing Company Ltd, New York.

5 NPTEL video : www.youtube.com/watch?v=t9WKOcRB63Q&list=PLJ5C_6qdAvBFzL9su5J-FX8x80BMhkPy1

6 https://www.w3schools.com/c/c_getstarted.php

7 https://www.geeksforgeeks.org/c-programming-language/

15/10/2023
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Course Code	Course Name	Category	L	T	P	Credit
222PY1A5CA	MATHEMATICAL PHYSICS	CORE	4	1	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The physical phenomena in different geometries.
- The mathematical tools to address formalism used in the core course.
- The basic of mathematical function.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Represent Linear Transformations as matrices and understand basic properties of matrices.	K2
CO2	Apply vector spaces and matrices in the quantum world.	K3
CO3	Understand the basic properties of the vector operations.	K2
CO4	Understand the concept of gradient of scalar field and divergence and curl of vector fields.	K2
CO5	Learn about gamma and beta functions and their applications	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

222PY1A5CA	MATHEMATICAL PHYSICS	SEMESTER V

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Matrices **12 h**

Null Matrices - Diagonal, Scalar and Unit Matrices - Upper - Triangular and Lower - Triangular Matrices - Transpose of a Matrix - Symmetric and Skew - Symmetric Matrices - Conjugate of a Matrix-Hermitian and Skew-Hermitian Matrices - Singular and Non-Singular matrices - Orthogonal and Unitary Matrices - Rank of a matrix.

Unit II Eigen-values and Eigenvectors **12 h**

Eigen values and Eigen vectors of Matrix - Diagonalization of Matrices - Properties of Eigen values and Eigen Vectors of Orthogonal, Hermitian and Unitary Matrices - Cayley-Hamiliton Theorem (Statement only). Inverse of a matrix using Cayley-Hamiltion Theorem -Application of Matrices: Solving ordinary second order differential equations - Coupled Linear Ordinary Differential Equations of first order.

Unit III Vector Calculus **12 h**

Addition of Vectors - Multiplication of Vectors by a Scalar - Orthogonal Resolution of Vectors - Rotation of Coordinates - Product of two vectors - Physical Applications: Product of two vectors - Work done by Force - Activity of a Force - Torque about a Point - Angular Velocity of Rigid body.

Unit IV Integral Calculus **12 h**

Line integral, surface integral and volume integral – Fundamental theorem of Gradients – The divergence of a vector - Gauss's Divergence Theorem (Statement only) – The fundamental theorem of curl – Stoke's theorem (Statement only). Divergence less and curl less fields. Curvilinear co-ordinates: Spherical Polar coordinates – Cylindrical coordinates (Basics).

Unit V Special Functions **12 h**

Definitions – The Beta function – Gamma function – Evaluation of Beta function – Other forms of Beta function – Evaluation of Gamma function – Other forms of Gamma function - Relation between Beta and Gamma functions – Dirac's delta function.

Text Books

1 Gupta B D, 2018, "Mathematical Physics", 3rd Edition, Vikas Publishing House, New Delhi.]

2 Sathya Prakash, 2016, "Mathematical Physics", 8th Edition, S. Chand and Co, New Delhi.

References

1 Rajput B S, 2017, "Mathematical Physics", 23rd Edition, Pragati Prakashan, New Delhi.

2 Dass H K, 2015, "Mathematical Physics", 7th Edition, S Chand and Co, New Delhi.

3 Bhattacharyya B, 2010, "Mathematical Physics", 3rd Edition, NCBA, West Bengal.

4 e-Book) Arfken G, Weber H, Harris F E, 2017, "Mathematical Methods for Physicists: A Comprehensive Guide", 7th Edition, Academic Press, United Kingdom.

5 Weblink: www.digimat.in/nptel/courses/video/111107112/L01.html

Course Code	Course Name	Category	L	T	P	Credit
222PY1A5CB	CLASSICAL AND STATISTICAL METHODS OF ANALYSIS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The mechanics of systems of particles and conservation theorems.
- The basic Lagrangian and Hamiltonian formulations and equations
- The concept of classical and quantum statistics of molecules.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Compare linear momentum, angular momentum and energy for particles and a system of particles.	K2
CO2	Apply the theory of Lagrangian for oscillator and pendulums.	K2
CO3	Construct Hamiltonian functions and canonical transformations	K3
CO4	Explain the classical Maxwell's Boltzmann statistics.	K3
CO5	Analyze Bose-Einstein and Fermi Dirac quantum statistics.	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

222PY1A5CB	CLASSICAL AND STATISTICAL METHODS OF ANALYSIS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Mechanics of a Particle and a System of Particles **10 h**

Conservation of linear momentum - Conservation of angular momentum - Conservation of energy: Work - Kinetic energy and work-energy theorem - Conservative force and potential energy - Conservation theorem. Mechanics of a system of particles - External and internal forces -Centre of mass - Conservation of linear momentum - Frame of reference - Conservation of angular momentum - Conservation energy- Kinetic energy - Potential energy.

Unit II Lagrangian Formulation **10 h**

Constraints and degrees of freedom – Generalized coordinates – Generalized displacement – Velocity – Acceleration – Momentum – Force – Potential energy – D'Alembert'sprinciple – Lagrangian equation from D'Alembert's principle – Application of Lagrange's equation of motion: Simple pendulum - Compound pendulum.

Unit III Hamiltonian Formulation **09 h**

Phase space – Hamiltonian function – Hamiltonian principle – Hamilton's canonical equations of motion- Physical significance of H – Applications of Hamiltonian equations of motion: Simple pendulum - Compound pendulum - Linear harmonic oscillator – Canonical transformations .

Unit IV Classical Statistics **10 h**

Phase space- Ensembles- Density of distribution in the phase space-Statistical Equilibrium – Microstate and Macro states - Stirling's Formula – Maxwell's-Boltzmann distributive law - Maxwell distributive law of velocities.

Unit V Quantum Statistics **09 h**

Postulates of Quantum mechanics – Quantum statistics of identical particles – Bose Einstein Statistics: Bose Einstein Distribution law - Fermi - Dirac statistics: Fermi Dirac Distribution law – Comparison of three statistics –Black body radiation and Planck's Radiation.

Text Books

1 Gupta, Kumar, Sharma, 2005, "Classical Mechanics", 3rd Edition, Pragati Prakashan Publishers & Meerut.

2 e-Book) Sathyaprakash, 1981, "Statistical Mechanics",6th Edition, Kedar Nath and Ram Nath, Meerut& New Delhi..

References

1 Gupta. B.D, Satyaprakash, 1991,"Classical Mechanics" KedarNath and Ram Nath, Meerut& New Delhi.

2 Upadhyaya. J. C, 2018, "Classical Mechanics", 2nd Edition, Himalaya Publishing House & Mumbai..

3 Brijlal, Subramaniam, 2002, "Heat & Thermodynamics", S.Chand & Company Ltd. & India.

4 Goldstein. H, Poole. C, Safko. J, 2002, "Classical Mechanics", Dorling Kindersley Pvt Ltd. & India..

5 Weblink: https://www.youtube.com/watch?v=zgs75Qc347I

Course Code	Course Name	Category	L	T	P	Credit
222PY1A5CC	SOLID STATE PHYSICS	CORE	4	1	-	5

PREAMBLE

This course has been designed for students to learn and understand

- The basic of crystalline materials, the interatomic forces, and bonds between solids
- Various aspects of behavior of solids with their magnetic properties
- The importance of superconducting materials in engineering applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Analyze fundamentals of crystal and crystal structures	K2
CO2	Examine the fundamental of bonding and the different types of bonding in solids	K4
CO3	Develop knowledge on the basics of magnetic phenomena on materials and various types of magnetizations	K4
CO4	Infer the magnetic and dielectric properties of crystalline structures	K4
CO5	Summarize the properties of superconducting materials	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

222PY1A5CC	SOLID STATE PHYSICS	SEMESTER V

Total Credits: 5

Total Instruction Hours: 60 h

Syllabus

Unit I Crystal Symmetry — 12 h

Crystallography- Distinction between crystalline and amorphous solids –Crystal lattice – Basis – Crystal structure – Unit cell – Number of lattice points per unit cell- Bravais lattices – Interplanar distance - Miller indices – Atomic packing - Atomic radius – Lattice constant and density- Types of cubic lattice - NaCl crystal - Structure of diamond

Unit II Bond Theory and Thermal Properties of Solids — 12 h

Classification of solids - Basics of Bond theory in crystals – Ionic, Covalent, Metallic, Molecular and Hydrogen bonding - Specific heat capacity of solids – Einstein's theory of specific heat of solids –Debye's theory of specific heat capacity of a solid - Hall Effect: Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient

Unit III Magnetic Properties — 12 h

Dia, Para, and Ferromagnetic materials - Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Ferromagnetism – Domain theory of Ferromagnetism - Hysteresis based on domains – Antiferromagnetism – Ferrimagnetism – Structure of Ferrites

Unit IV Dielectric Properties — 12 h

Band theory of solids – Polarization - Types of polarizabilities- Dielectric constant and displacement vector - Dielectric loss - Clausius Mosotti relation - Properties of dielectrics in alternating fields - Ionic polarizability as a function of frequency - Effects of dielectrics

Unit V Superconducting Properties and Applications — 12 h

Introduction - General properties of superconductors - Effect of magnetic field - Meissner effect - Specific heat - Isotope effect - London equations - Type–I and Type–II superconductors - Explanation for the occurrence of superconductivity - BCS theory - High temperature superconductors

Text Books

1 A.M.Wahab, 2007, "Structure and Properties of Materials", 2nd edition , Narosa Publishing house, New Delhi, India.

2 Pillai S.O, 2010, "Solid State Physics", 6th Edition, New Age Publisher, New Delhi.

References

1 E-book: Murugeshan R. and Kiruthiga Sivaprasath Er, 2008," Modern Physics", S Chand and Co, New Delhi.

2 Gupta, Kumar, 2012," Solid State Physics", K.Nath & Co, Meerut.

3 Charles Kittel, 2004, "Introduction to Solid State Physics", 8th Edition, John Wiley & Sons, New York

4 Raghavan V, 2004," Materials Science and Engineering", Prentice Hall of India Private Limited, New Delhi).

5 https://www.youtube.com/watch?v=OTDVov_kw6A

222PY1A5CP	CORE PRACTICAL : ADVANCED PHYSICS	SEMESTER V

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Study the Hall coefficient of given p- type materials and obtain the charge carrier density in each case and study the Hall mobility.
2	Study the Hall coefficient of given n- type materials and obtain the charge carrier density in each case and study the Hall mobility.
3	Find the Specific resistance of a semiconductor –Thermal Method.
4	Determination of the velocity of sound in the given liquid using ultrasonic interferometer.
5	Study the magnetic susceptibility of given diamagnetic substances. (Under DBT-STAR Scheme)
6	Draw and analyze the I-V Characteristics of a PN junction diode. (Under DBT-STAR Scheme)
7	Determine the breakdown voltage of the given Zener diode. (Under DBT-STAR Scheme)
8	Analyze the I-V Characteristics of a Photo transistor. (Under DBT-STAR Scheme)
9	Analyze the I-V Characteristics of a solar cell. (Under DBT-STAR Scheme)
10	Study the characteristics of transistor.
11	Logic gates OR, AND, NOT, NOR and NAND Gates.
12	NAND gate as a universal gate.

Note: Any 10 Experiments

References

1 Geeta Sanon R., 2009. "B.Sc. Practical Physics", 2nd Ed., S. Chand and Co., New Delhi.

2 Prakash I., and Ramakrishna, 2011, "A Textbook of Practical Physics", 11th Edition, Kitab Mahal.

3 Flint B. L., Worsnop H. T., 2000, "Advanced Practical Physics for students", Asia Publishing House.

4 Sathya Prakash, 2010, Practical Physics and Electronics, S. Chand. and Co., New Delhi.

222PY1A5CQ	CORE PRACTICAL: C PROGRAMMING	SEMESTER V

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Write a C program to find the roots of Quadratic Equation $Ax^2+Bx+C=0$.
2	Write a C program to convert Celsius scale into Fahrenheit scale.
3	Write a C program to find resultant value of the three resistances R_1, R_2 and R_3 connected in (i) series and (ii) parallel.
4	Write a C program to calculate refractive index of the material of the prism.
5	Write a C program to measure resonant frequency of the LCR series circuit.
6	Write a C program to calculate De Broglie wavelength of a material for the given value of momentum p.
7	Write a C program for Matrix addition.
8	Write a C program for Matrix multiplication.
9	Write a C program for Average of set of numbers.
10	Write a C program to determine Area of triangle.
11	Write a C program to find the largest of 'N' numbers in the given array.
12	Write a C program to perform i) String Copy ii) String Concatenation iii) String Reverse.

Note: Any 10 Experiments

References

1. Balagurusamy E, 2012, "Programming in ANSI C", 6th Edition, Tata McGraw Hill Publishing Company Ltd, New York.
2. Yaswanth Kanitkar, 2012," Let Us C", 13th Edition, BPB Publication, New Delhi.
3. Karthikeyan E, 2008, "A Textbook on C", Prentice Hall India, New Delhi.
4. Palaniswamy S, 2004," Physics Through C Programming", Pragati Publication, Meerut.

Course Code	Course Name	Category	L	T	P	Credit
222PY1A5SA	FUNDAMENTALS OF IoT	SEC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The basic concepts of internet of things.
- The basic architecture of internet of things.
- The applications of internet of things.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify the characteristics and physical design.	K2
CO2	Interpret the design methodology.	K2
CO3	Apply the concepts with RASPBERRY PI.	K3
CO4	Relate the concepts to ARDUINO	K2
CO5	Apply the concepts into various applications	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

222PY1A5SA	FUNDAMENTALS OF IoT	SEMESTER V

Total Credits: 2

Total Instruction Hours: 36 h

Syllabus

Unit I **Introduction to IoT** **7 h**

Introduction - Characteristics - Physical Design – Protocols – Logical design - Enabling technologies - IoT Levels – Domain Specific IoTs – IoT vs M2M.

Unit II **IOT design methodology** **7 h**

IoT systems management - IoT Design Methodology – Specifications Integration and Application Development.

Unit III **Building IOT with RASPBERRY PI** **8 h**

Physical device – Raspberry Pi Interfaces – Programming – APIs/Packages – Web Services.

Unit IV **Building IOT with GALILEO/ARDUINO** **7 h**

Intel Galileo Gen2 with Arduino - Interfaces Arduino IDE – Programming - APIs and Hacks.

Unit V **Applications of IoT** **7 h**

Applications in home, Industry, Agriculture, Health and Lifestyle - Connecting IoT to Cloud – Cloud Storage for IoT – Software Management Tools for IoT.

Text Books

1 Arshdeep Bahga, Vijay Madisetti, 2015, "Internet of Things – A hands on approach" Universities Press.

2 Manoel Carlos Ramon, 2014, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers" Apress.

References

1 Olivier Hersent and David Boswathick, 2015, "The internet of things" John Wiley and Sons.

2 https://onlinecourses.nptel.ac.in/noc17_cs22/course.

3 http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.htm.

Course Code	Course Name	Category	L	T	P	Credit
222PY1A5DA	RENEWABLE ENERGY SOURCES	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The present energy crisis and various available energy sources.
- The basic principles and applications of different forms of energy.
- The different nonconventional energy sources and the methods of harnessing energy from them.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss various sources of energy for harvesting.	K3
CO2	Understand the need of energy conversion and the various methods of energy storage.	K2
CO3	Explain the fundamental properties of silicon cell.	K2
CO4	Explain bio gas and the generation of bio gas.	K2
CO5	Learn the concepts of energy from wind and other sources.	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

222PY1A5DA	RENEWABLE ENERGY SOURCES	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Alternate Sources of Energy **10 h**

Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, bio-gas generation, geothermal energy tidal energy, Hydroelectricity.

Unit II Solar Energy **10 h**

Solar energy, its importance, storage of solar energy, solar pond, non- convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photo-voltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Unit III Photovoltaic Systems **10 h**

Introduction–Photovoltaic principle–Basic Silicon Solar cell– Power output and conversion efficiency–Limitation to photovoltaic efficiency–Basic photovoltaic system for power generation–Advantages and disadvantages–Types of solar cells–Application of solar photovoltaic systems – PV Powered fan – PV powered area lighting system – A Hybrid System.

Unit IV Energy from Biomass **9 h**

Introduction–Biomass conversion technologies–Bio–gas generation–Factors affecting bio–digestion –Working of biogas plant–Advantages and disadvantage of floating and fixed dome type plant–Bio–gas from plant wastes–Methods for obtaining energy from biomass–Advantages and disadvantages of biological conversion of solar energy.

Unit V Wind Energy and other Energy Sources **9 h**

Wind Energy Conversion–Classification and description of wind machines, wind energy collectors–Energy storage–Wind data–energy audit– Energy and power from waves– wave energy conversion devices– Fuel cells– and application of fuel cells– batteries– advantages of battery for bulk energy storage– Hydrogen as alternative fuel for motor vehicles.

Text Books

1 Kothari D.P., K.C. Singal and Rakesh Ranjan, 2008, "Renewable energy sources and Emerging Technologies", Prentice Hall of India.

2 Garg H.P. and Prakash J., 2006, "Solar Energy Fundamentals and Application", 7th Reprint TataMcGraw – Hill Publishing.

References

1 Chetan Singh Solanki, 2011, "Solar Photvoltaics Fundamentals", Technologies and Applications, 2ndEdition, PHI Learning Private Limited.

2 Rai G. D, 2010, "Non conventional Energy sources", 4th Edition, Khanna Publishers.

3 Jeffrey M. Gordon, 2013, "Solar Energy: The State of the Art", Earthscan.

4 Kalogirou S.A., 2013, "Solar Energy Engineering: Processes and Systems", 2nd Edition, Academic Press.

5 Weblink: www.digimat.in/nptel/courses/video/121106014/L01.html

6 E-Book: Anne E. Maczulak, 2010, "Renewable Energy: Sources and methods", 1st Edition.

Course Code	Course Name	Category	L	T	P	Credit
222PY1A5DB	LASER PHYSICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concept and special properties of lasers
- The working mechanism of various types lasers
- The important applications of laser in industrial and medical field

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the three different emission modes in laser Physics.	K2
CO2	Solve the condition of lasing action.	K3
CO3	Identify different types of lasers on the basis of medium.	K3
CO4	Summarize the industrial applications of lasers.	K2
CO5	Outline the medical applications of lasers in eye surgery and skin treatment.	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

222PY1A5DB	LASER PHYSICS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Principles of Laser** **10 h**

Lasers - Interaction of Radiation with Matter – Absorption and Emission of Light – Three Processes: Induced Absorption, Spontaneous Emission, Stimulated Emission -Difference between Spontaneous and Stimulated Emission - Einstein's Co-efficient (derivation) - Population Inversion – Pumping Methods – Active Medium – Metastable States - Pumping Schemes.

Unit II **Properties of Lasers** **10 h**

Amplification and Gain – Optical Resonator and its action – Threshold condition for Lasing – Condition for steady-state oscillation – Gain saturation - Laser operating frequencies – Cavity configurations – Levels of laser action: 2 level system - 3 level System.

Unit III **Types of Lasers** **10 h**

Classification of Lasers - Solid State Laser - Ruby Laser - Nd:YAG laser - Gas Lasers -He-Ne Laser – CO2 Laser - Dye Lasers - Semiconductor Lasers - Semiconductor Diode lasers: homo-junction and hetero-junction lasers.

Unit IV **Industrial Applications of Lasers** **9 h**

Characteristics and Applications of Some Common Lasers – Lasers in Material Processing – Surface Treatments – Drilling – Cutting – Different Methods of Cutting – Welding – Heat Treating – Lasers in Electronic Industry – Scribing – Soldering- Photolithography – Laser in nuclear energy - Bar Code Reader.

Unit V **Medical Applications of Lasers** **9 h**

Laser in Medicine and Surgery – Eye Laser Surgery – Photocoagulations – Light-Induced Biological Hazards: Eye and Skin – Eye Damage: Wavelength Dependence – Ocular Damage Mechanism - Human Skin and Damages – Skin Conditioning using Laser - Laser Applications in Dentistry – Laser Angioplasty – Different Laser Therapies - Laser Endoscopy.

Text Books

1 Avadhanulu M.N., P.S. Hemne, 2017, "An Introduction to Lasers theory and applications", S. Chand and Co., New Delhi.

2 E-Book: Murugasen R. and Kiruthiga Sivaprakash, 2014,"Modern Physics", S. Chand & Company, Pvt. Ltd. & New Delhi.

References

1 Laud B.B., "Lasers and Non linear Optics", New Age International (P) Ltd., New Delhi.

2 Thyagarajan, 2016, "LASERS: Fundamentals And Applications", Infinity press.

3 Nair K. P. R., 2009, "Atoms, Molecules and Lasers", Narosa publishers.

4 Walter Koechner, 1993, "Solid state Laser Engineering", 6th edition, Springer.

5 Weblink: www.nitttrc.edu.in/nptel/courses/video/115102026/L33.html

Course Code	Course Name	Category	L	T	P	Credit
222PY1A5DC	PHYSICS OF DEVICES AND INSTRUMENTATION	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The theory behind the working of various electronic devices.
- The basic principles and working mechanism of different electrical appliances.
- The importance of modulation techniques involved in communication systems.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss various electronic devices for instrumentation.	K3
CO2	Understand the principle of filters and power supply systems.	K2
CO3	Explain the processing techniques involved in IC fabrication.	K2
CO4	Explain the working mechanism of various electrical appliances.	K2
CO5	Learn the concepts involved in communication systems.	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

222PY1A5DC	PHYSICS OF DEVICES AND INSTRUMENTATION	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Devices **10 h**

Characteristic And Small Signal Equivalent Circuits Of UJT And JFET - Metal Semiconductor Junction - Metal Oxide Semiconductor (MOS) Device - Ideal MOS and Flat Band Voltage - Tunnel Diode.

Unit II Power Supply and Filters **9 h**

Block Diagram of a Power Supply - Qualitative idea of C and L Filters - IC Regulators - Line and load Regulation - Short Circuit protection - Active and Passive Filters - Low Pass, High Pass, Band Pass and band Reject Filters - Astable and Monostable - Multivibrators using transistors.

Unit III Processing of Devices **12 h**

Basic process flow for IC fabrication - Electronic grade silicon - Crystal plane and orientation - Defects in the lattice - Oxide layer - Oxidation Technique for Si - Metallization technique - Positive and Negative Masks - Optical lithography - Electron lithography - Feature size control and wet anisotropic etching - Lift off Technique - Diffusion and implantation.

Unit IV Physics of Electrical Appliances **8 h**

Refrigeration, Air conditioning - Home Security System - CCTV Device - Vacuum Cleaning and Microwave Heating - Electric Heating - Induction Heating (General Principles and working.

Unit V Introduction to Communication Systems **9 h**

Block Diagram of Electronic Communication System - Need for Modulation - Amplitude Modulation - Modulation Index - Analysis of Amplitude Modulated Wave - Sideband frequencies in AM Wave - Demodulation of AM wave using Diode Detector.

Text Books

1 Sze S.M. and Know K. Ng, 2008, "Physics of Semiconductor Devices", 3rd Edition, John Wiley and Sons. USA.

2 Ryder J.D., 2004, "Electronics: Fundamentals and Applications", Prentice Hall.

References

1 Salivahanan S. and Kumar N.S., 2012, "Electronic devices & circuits",Tata Mc-Graw Hill, New Delhi.

2 Helfrick and Cooper, 1990, "Modern Electronic Instrumentation and Measurement Technology", PHI Learning.

3 Ajay Kumar Singh, 2011, "Electronic devices and integrated circuits", PHI Learning Pvt. Ltd.

4 Kennedy G., 1999, "Electronic Communication systems", Tata McGraw Hill New Delhi.

5 Weblink: https://www.youtube.com/watch?v=1uPTyjxZzyo

222PY1A5GA	GENERIC ELECTIVE - ECO PHYSICS	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I **Ecosystems in Physics** **4 h**

Ecosystems: Energy flow in ecosystem – Ecosystem productivity – Carbon cycle, Oxygen cycle – Biological control of chemical factors in the environment.

Unit II **Soil Physics** **5 h**

Soil strength and its measurements – Soil pollution – Control of soil pollution – Principles of Bioremediation – Biodegradation in soil ecosystem

Unit III **Environmental Physics** **5 h**

Physical, chemical and biological characteristics of waste water – Calculation of chlorine dosage – Sludge processing and disposal methods – Radiation hazards – Deforestation.

Unit IV **Renewable Energy Sources** **5 h**

Geo Thermal Energy - Tidal Energy - Wind Energy - Solar Energy - Hydroelectricity - Bio mass Energy.

Unit V **Solar Energy and Its Applications** **5 h**

Photoelectric effect - Silicon Wafers - Solar Water Heater – Solar Cooking - Working of Hybrid Solar Cells – New Generation Solar Cells.

Text Books

1 E Book: John Twidell and Tony Weir, 2006, "Renewable Energy Resources", 2nd Edition, Taylor & Francis Group.

2 Rai G.D., 2004, Solar Energy Utilization, Khanna Publishers, New Delhi.

References

1 Kothari D P, Singal K C, Rakesh Ranjan, 2014, "Renewable Energy Sources and Emerging Technologies" 2nd Edition, PHI Learning (P) Ltd, New Delhi.

2 E-Book: Anne E. Maczulak, 2010, "Renewable Energy: Sources and methods", 1st Edition.

3 https://www.slideshare.net/sanjanaangel16/ biomass-energy-ppt

4 https://www.google.com/url sa=t&source=web&rct= j&url=https://th.fhi-berlin.mpg.de/th/lectures/materialscience

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Course Code	Course Name	Category	L	T	P	Credit
222PY1A6CA	RELATIVITY AND QUANTUM MECHANICS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The special theory of relativity
- The basic postulates of quantum mechanics
- The Schrodinger wave equations and its applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Relate with the theory of relativity and Lorentz transformation	K3
CO2	Explain the basic concept of properties of waves, de Broglie wavelength and photoelectric effect	K2
CO3	Summarize uncertainty principle, its physical significance and applications	K2
CO4	Apply the concepts of Schrodinger equation to one dimensional problem	K3
CO5	Extend the Quantum mechanical concepts to three-dimensional problem	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

222PY1A6CA	RELATIVITY AND QUANTUM MECHANICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Special Theory of Relativity 10 h

Frame of references – Galilean transformation – Newtonian relativity – The velocity of light – Failure of Newtonian mechanics – Newtonian relativity and electromagnetism – The concept of Ether – Michelson–Morley experiment – Einstein's postulates – Lorentz transformations – Inverse transformations – Velocity transformation – Length contraction – Time dilation – Variation of mass

Unit II Wave Packet Description 10 h

Phase velocity and group velocity – Analytical expression for a group of waves – Derivation of the De'Broglie relation - Relation between the phase velocity and the wavelength of De'Broglie wave – De'Broglie wavelength associated with a particle of mass M and kinetic energy – Verification of De'Broglie relation – Davisson and Germer's experiment – G P Thomson's experiment

Unit III Basics of Uncertainty Principle 9 h

Uncertainty principle – Elementary proof between displacement and momentum – Energy and time – Physical significance of Heisenberg's uncertainty principle – Diffraction of electrons through a slit – Gamma ray microscope thought experiment – Applications: Non-existence of free electrons in the nucleus – Size and energy in the ground state of hydrogen atom

Unit IV Schrodinger Equation and its solutions 10 h

Schrodinger equation - Properties of wave function - Probability interpretation of wave function and probability current density - Operators - Expectation value – Eigen values and eigen functions - Time dependent form - Time independent form - Particle in one dimensional box - Equation of continuity.

Unit V Angular Momentum in Quantum Mechanics 9 h

Orbital angular momentum operators and their commutation relations - Separation of three-dimensional Schrodinger equation into radial and angular parts - Elementary ideas of spin angular momentum of an electron - Pauli matrices.

Text Books

1 Murugeshan R and Kiruthiga S, 2008, "Modern Physics", S. Chand & Co and New Delhi.

2 Mathews P.M and Venkatesan S, 2005, "A Text book of Quantum mechanics", TataMcGraw - Hill and New Delhi.

References

1 Gupta S.L, Kumar V. and Sharma H.V, 2015, "Quantum Mechanics",31st Edition, Jai Prakash Nath Publications and Meerut.

2 Aruldas G, 2017, "Quantum Mechanics",2nd Edition, PHI Learning and New Delhi.

3 Thangappan V.K, 2018, "Quantum Mechanics", New age publication and New Delhi.

4 [E-book]: Sakurai J J., 2016, "Modern Quantum Mechanics",Addison Wesley Publishing Company.

5 https://www.youtube.com/watch?v=-YqL0TQnvFI

6 NPTEL Video: https://www.youtube.com/watch?v=TcmGYe39XG0

7 NPTEL Video: https://www.youtube.com/watch?v=jANZxzetPaQ

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6CB	DIGITAL ELECTRONICS AND MICROPROCESSORS	Core	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The basics of number systems, Boolean algebra and logic gates.
- The basics of microprocessor architecture and assembly languages.
- The instructions to write assembly language programming.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Interpret problems related to number systems and binary codes.	K2
CO2	Apply Boolean algebra and Demorgan's theorem in circuit designing.	K2
CO3	Outline the microprocessor architecture and assembly language.	K2
CO4	Explain memory and I/O devices.	K3
CO5	Apply instructions to write assembly language Programming.	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

222PY1A6CB	DIGITAL ELECTRONICS AND MICROPROCESSORS	SEMESTER VI

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I **Number System, Binary Arithmetic and Codes** 08 h

Binary Numbers - Octal numbers - Hexadecimal numbers (Conversion of one number system into other). Arithmetic operation – Binary Addition – Binary subtraction – 1's complement subtraction - 2's complement subtraction. Binary coded decimal – Weighted binary codes – Non-weighted codes - Excess 3 codes – Grey codes.

Unit II **Boolean Algebra, Logic Gates and Arithmetic Circuits** 07 h

Basic laws of Boolean algebra - Properties of Boolean algebra – De Morgan's theorems. Logic Gates: OR, AND, NOT, NAND, NOR, Ex-OR, Ex-NOR gates – Universal building blocks - Half adder – Full adder – Half Subtractor – Full Subtractor – Parallel binary adder – Parallel binary Subtractor – Binary to Grey code converter – Grey to Binary converter.

Unit III **Microprocessor Architecture and Assembly Language** 07 h

Microprocessor Organization - Languages: Machine, Assembly and ASCII code - High level language. Operating systems - Microprocessor architecture and its operations: Initiated operations - Internal data operations - External initiated operations.

Unit IV **Microcomputer Systems** 07 h

Memory addressing - Address lines, Word size and Classification. I/O devices - Logic devices for interfacing: Decoder – Encoder. 8085 MPU: 8085 Microprocessor – Communication and Bus timings - Control signals.

Unit V **8085 Assembly Language Programming** 07 h

Instruction classification – Data Transfer (copy) operations – Arithmetic operations – Logic operations – Branch operations - Instruction word size and data format – Write, Assemble and Execute a simple program – Debugging a program.

Text Books

1 Puri V.K, 2007, "Digital Electronics: Circuits and Systems", Tata McGraw Hill Publishing Company Ltd., New Delhi.

2 Ramesh S Gaonkar, 2002, "Microprocessor Architecture Programming and Application with the 8085", Prentice Hall, New Delhi.

References

1 NagoorKani A, 2012, "Microprocessors and Microcontrollers", Second Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi.

2 Adithya P Mathur, 2016, "Introduction to Microprocessors", Tata McGraw Hill Education, New Delhi.

3 Malvino and Leach, 2010, "Digital Principles and Applications", Tata McGraw Hill Publishing Company Ltd., New Delhi.

4 Yadav D S, 2008, "Microprocessor and Microcontroller",2nd Edition, New age international publisher Pvt. Ltd & New Delhi.

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

222PY1A6CP	CORE PRACTICAL: ELECTRONICS	SEMESTER VI

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Construct half adder and full adder circuits using NAND Gate and verify its truth table.
2	Construct and verify the values of Monostable multivibrator using OP-AMP or transistor
3	Study the characteristics of JFET (Under DBT Scheme)
4	OP-AMP parameters – Adder, Subtractor
5	OP-AMP applications - Inverting-non-inverting
6	OP-AMP parameters - Integrator, differentiator
7	Construct an Astable multivibrator using OP-AMP or transistor
8	Verification of De Morgan's theorem
9	8085 ALP for 8-bit Addition and Subtraction
10	Microprocessor 8085 - LED Interfacing
11	Op-amp - Study of the attenuation characteristics and design of the phase-shift oscillator.
12	To design, construct and verify the operation of the following flipflops using gates (i) S-R Flip Flop using NOR Gates (ii) S-R Flip Flop using NAND Gate

Note: Any 10 experiments to be performed

1 C.L. Arora, 2002, "B.Sc. Practical Physics", S. Chand, New Delhi

2 Sathya Prakash, 2003, "Practical physics and Electronics", S. Chand & Co., New Delhi. .

3 https://www.youtube.com/watch?v=aKMD5S-fI1g

4 Ramesh Gaonkar, S., 2010, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, New Delhi

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6SA	FUNDAMENTALS OF AI	SEC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The foundations of Artificial Intelligence.
- The basic areas of artificial intelligence including knowledge representation.
- The application of present scenario in AI.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the fundamental understanding of the history of AI and its foundations.	K2
CO2	Illustrate the machine learning through different process	K2
CO3	Explain the Deep Learning using networks.	K2
CO4	Apply Robotic Process Automation in real world.	K3
CO5	Recognize the implementation and applications of AI.	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

222PY1A6SA	FUNDAMENTALS OF AI	SEMESTER VI

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Foundations of AI 06 **h**

Introduction - History of AI - Structure of AI - Types of Data - Big Data - Data process - Ethics and Governance.

Unit II Machine Learning 05 **h**

Introduction to Machine Learning - Machine Learning Process - Supervised Learning - Unsupervised Learning - Decision Tree - Ensemble Modelling.

Unit III Deep Learning 05 **h**

Introduction to Deep Learning - Difference between Deep Learning and Machine Learning - Artificial Neural Networks - Recurrent Neural Networks - Applications.

Unit IV Robotic Process Automation 04 **h**

Introduction to RPA - Pros and Cons of RPA - Determine the right functions to automate - RPA and AI - RPA in the Real world.

Unit V Implementation and Future of AI 04 **h**

Approaches to implement AI - Steps for AI implementation - Right Tools and Platforms - Automobiles - Drug discovery.

Text Books

1 Tom Taulli, 2023, "Artifical Intelligence Basics", 2nd edition, Apress.

2 Nils J. Nilsson, 2002, "Principles of Artificial Intelligence, 2nd edition, N.K. Mehra for Narosa Publications.

References

1 John Paul Mueller, 2023, "Artificial Intelligence", Pearson & Uttar Pradesh.

2 Prabhat Kumar, 2015, "Artificial Intelligence Reshaping Life and Business", McGraw Hill Education & New Delhi.

3 Michael Negnevitsky, 2001, "Artificial Intelligence", Tata McGraw Hill& New Delhi.

4 Yadav D S, 2008, "Artificial Intelligence and Applications", 2nd Edition, New age international publisher Pvt. Ltd & New Delhi.

5 https://onlinecourses.nptel.ac.in/noc21_ge20/preview

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6DA	NANOPHYSICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The dimensions of nanostructures and their synthesis methods.
- The special nanomaterials and characterization techniques.
- The applications of nanomaterials in energy, environment and medicine.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the nano dimensional materials and properties	K2
CO2	Illustrate the preparation of nanomaterials	K3
CO3	Summarize the special nanomaterials	K2
CO4	Explain the characterization tools of nanomaterials	K3
CO5	Extend nanomaterials for energy, environment and medical applications	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

222PY1A6DA	NANOPHYSICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Concepts of Nanoscience and Properties** **10 h**

Emergence of Nanotechnology – Scientific revolution – Classification of nanostructures (0D, 1D, 2D and 3D) – Surface area to volume ratio – Size effect in nanoparticles: Optical properties – Structural properties – Mechanical properties – Challenges of Nanotechnology.

Unit II **Preparation of Nanomaterials** **09 h**

Bottom-up and top-down approaches – Ball Milling – Sputtering – Vapor liquid solid (VLS) growth – Electron beam lithography – Sol-gel method – Chemical vapor deposition – Hydrothermal method – Electrochemical deposition.

Unit III **Nanostructured Materials** **09 h**

Carbon Fullerenes – Carbon nanotubes – Random mesoporous structures – Core-shell structures: metal-oxide structures – Metal-polymer structures – Nanocomposites and nanograined materials – Quantum confinement – Quantum dots.

Unit IV **Characterization of Nanomaterials** **10 h**

X-ray diffraction – UV-Visible spectrometer – Raman spectroscopy – Fourier Transform infrared spectrometer – Scanning electron microscopy – Transmission electron microscopy – Vibrating sample magnetometer.

Unit V **Applications of Nanomaterials** **10 h**

Nanoelectronics – Dye sensitized solar cells – Quantum electronic devices – Food processing and food packaging – Nanofertilizers – Nanoelectromechanical system (NEMS) based device – Nano sensors – Nano medicines – Nanobots.

Text Books

1 Guozhong Cao, 2017, "Nanostructures & nanomaterials: Synthesis, properties & applications", 2nd Edition, World Scientific Publishing Co. Pte. Ltd.

2 Pradeep T, 2007, "Nano-The Essentials" Tata McGraw-Hill publishing company limited, New Delhi.

References

1 Charles P. Poole Jr, Frank and Ownes, 2012, "Introduction to Nanotechnology", Sathyam Enterprise, New Delhi.

2 Rajendran V, 2010, "Processes and Characterization of Advanced Nanostructured materials", 1st Edition, Macmillan, India.

3 Chattopadhyay K K and Banerjee A A, 2009, "Introduction to Nanoscience and Nanotechnology", PHI Learning private Limited.

4 Chris Binns, 2010, "Introduction to Nanoscience and Nanotechnology", John Wiley & Sons, New Jersey.

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6DB	MATERIALS SCIENCE	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The bonding exhibiting in the materials
- The magnetic and dielectric properties of materials
- The formation of smart materials and different non-destructive testing methods

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Relate the bonding nature of materials with their engineering applications	K2
CO2	Illustrate mechanical behaviors of engineering materials	K2
CO3	Explain properties of magnetic materials and dielectric materials with their domain structure	K2
CO4	Infer the basic knowledge of smart materials and their applications	K2
CO5	Interpret about the different non-destructive testing facilities	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

222PY1A6DB	MATERIALS SCIENCE	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **Chemical Bonding and Engineering Materials** **8 h**

Bond energy – Bond type and bond length – Ionic and covalent bonding – Stability and metastability- Variation in bonding character and properties – Classification of engineering materials – Levels of structure – Structure property relationship in materials.

Unit II **Mechanical Behavior of Materials** **8 h**

Elastic behavior – Atomic Model of Elastic Behavior – Young's Modulus – Poisson's Ratio – Shear modulus – Bulk modulus – Modulus as a parameter of design – Rubber like elasticity – Plastic deformation – Tensile stress - Strain curve.

Unit III **Magnetic Materials and Dielectric Materials** **10 h**

Terminology and classification – Magnetic moment due to electron spin – ferromagnetism and the domain structure – Soft and hard magnetic materials - Polarization – Electronic, ionic, orientation and space charge polarization – Temperature and frequency effects – Electric breakdown – Ferroelectric materials.

Unit IV **Smart Materials** **12 h**

Definition of smart materials - Types - Piezoelectric Materials-Materials for MEMS and NEMS - Ferrofluid - Magnetic shape - Memory alloys (MSMAs) - Shape memory alloy (SMA) - One way and Two-way memory effect - Dielectric elastomers (DEs) - Light sensitive materials - Smart catalysts

Unit V **Non-Destructive Testing** **10 h**

Radiographic methods – Photo-elastic methods – Magnetic methods – Electrical method – Ultrasonic method - Equipments used for NDT – Metallurgical microscope - Electron microscope – Scanning electron microscope (SEM).

Text Books

1 Raghavan V, 2015, "Materials Science and Engineering – A first course", Sixth Edition, Prentice Hall India Learning Private Limited, New Delhi.

2 Arumugam M, 2016, "Materials Science: Physics of Materials", Third Edition, Anuradha Publications, Chennai.

References

1 Kittel C, 2016, "Introduction to Solid State Physics", Eighth Edition, Wiley India, New Delhi.

2 Smith W.M, 2018, "Materials Science and Engineering in SI Units", Fifth Edition, McGraw Hill Education, New Delhi.

3 Rajendran V, 2016, "Materials Science", Sixth Edition, McGraw Hill Education, New Delhi.

4 E-book: William D Callister Jr., David G Rethwisch, 2007, "Materials Science and Engineering: An Introduction", Eighth Edition, John Wiley and Sons, United States.

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6DC	RADIATION PHYSICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic characteristics and production of X-rays
- The fundamental concepts of radiation physics and its applications
- The concept of radiation therapy techniques and radiation protection devices

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Recall on the characteristics and production of X-rays	K1
CO2	Rummarize theory of radiation and various radiation chambers	K2
CO3	Explain principle and the function of various imaging system	K2
CO4	Discuss basic teletherapy techniques	K2
CO5	Analyze various measures and radiation protection devices	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

222PY1A6DC	RADIATION PHYSICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I X-Rays **10 h**

Electromagnetic spectrum - Production of x-rays - X-ray spectra - Brehmsstrahlung - Characteristic x-ray - X-ray tubes - Coolidge tube - X-ray tube design - Rotating anode x-ray tubes - Tube rating - Quality and intensity of x-ray

Unit II Radiation Physics **10 h**

Radiation units - Exposure - Absorbed dose - Rad gray - Kera relative biological effectiveness - Effective dose - Interaction of radiation with matter - Linear attenuation coefficient - Radiation detectors - Condenser chambers - Geiger counter - Ionization chamber - Dosimeters - Area monitors - TLD and semiconductor detectors

Unit III Medical Imaging Physics **9 h**

Radiological imaging - Radiography - Filters - Grids - Cassette - X-ray film - Film processing - Computed tomography scanner - Principle and function - Display - generations - Mammography - Gamma camera (Only Principle, function and display)

Unit IV Radiation Therapy Physics **10 h**

Radiotherapy - Kilo voltage X-ray machines - Deep therapy X-ray machines - Tele-cobalt therapy machines – Source capsule design – Head shielding – Shutter mechanism – Collimator assembly – Treatment couch – Control console – Particle accelerators - Medical linear accelerator

Unit V Radiation Protection **9 h**

Biological effects of radiation - somatic, genetic stochastic and deterministic effect – Radiation Risk – Radiation hazards, evaluation and control – External and Internal Hazards – Regulations in INDIA

Text Books

1 Thayalan K, 2003, "Basic Radiological Physics", Jayapee Brothers Medical Publishing Pvt Ltd, New Delhi

2 Khan F.M, 2003, "Physics of Radiation Therapy", 3rd Edition, Williams and Wilkins

References

1 Bushberg S, Leidholdt B, 2002, "The Essential Physics of Medical Imaging", 2nd Edition, Williams and Wilkins

2 Lippincot Williams and Wilkins, 1998, "Nuclear Medicine Physics", Chandra Publishers

3 [E-book]: Ervin B.P.,2016, "Radiation Physics for Medical Physicist",Springer International Publishers

4 Chary R, 2013, "Physics of Nuclear Radiations- Concepts, Techniques and Applications",CRC Press

5 https://www.youtube.com/watch?v=ipZTSCoWSv4

6 https://www.astro.org/Affiliate/ARRO/Resident-Resources/Educational-Resources/Webinars/Radiation-Biology-and-Physics

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6DD	SOLAR PHOTOVOLTAIC TECHNOLOGY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of PN junction diode in solar cells
- The design of solar cells and photovoltaic modules
- The balance of solar PV system and applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Extend the concept of PN junction in photovoltaic solar cells	K2
CO2	Develop solar cells and understand the effect of parameters involved in efficiency	K3
CO3	Explain the design and structure of PV module and PV module power output	K2
CO4	Apply the factors affecting battery performance and compare the PV systems	K3
CO5	Identify and evaluate the PV systems and their 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

222PY1A6DD	SOLAR PHOTOVOLTAIC TECHNOLOGY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I **PN Junction Diode: An Introduction to Solar Cells** 10 h

Energy band diagram of PN junction - PN junction potential - Width of depletion region - Carrier movements and current densities - Carrier concentration profile - Generation of Photovoltage - Light generated circuit - I-V equation of solar cells - Solar cell characteristics.

Unit II **Design of Solar Cells** 10 h

Upper limits of cell parameter: Short circuit current - Open circuit voltage - Fill Factor - Efficiency - Losses in solar cells: Model of a solar cell - Effect of series and shunt resistance on efficiency - Effect of solar radiation on efficiency - Effect of temperature on efficiency - Solar cell design

Unit III **Solar Photovoltaic Modules** 10 h

Series and parallel connection of cells - Design and structure of PV module: Number of solar cells in a module - Fabrication of PV modules - PV module power output: I - V equation of PV module - Ratings of PV modules - Effect of solar irradiation

Unit IV **Balance of Solar PV System** 9 h

Cell to battery- Battery parameters - Factors affecting Battery Performance: Battery voltage level - Battery discharge current - Batteries for PV systems: Lead-acid batteries - Ni-Cd batteries - Comparison of batteries

Unit V **Photovoltaic System design and Applications** 9 h

Type d Regulated standalone system with battery and AC and DC loads - Type e regulated hybrid system with AC and DC loads - Design of PV powered DC pump - Wire sizing in PV systems - Types of hybrid PV systems

Text Books

1 Chetan Singh S, 2013, "Solar Photovoltaics: Fundamentals, Technologies and Applications", PHI Learning Pvt Ltd, Delhi.

2 Kothari D.P, Singal K.C and Rakesh R, 2008, "Renewable energy sources and emerging Technologies", Prentice Hall of India.

References

1 Gary C, Lynn B, and Rick A, 1995, "Photovoltaic Fundamental" , National Technical Information Service, U.S. Department of Energy, U.S.

2 Antonio L, 2012, "Hand Book of Photovoltaic Science and Engineering", Wiley, India

3 Angele R, 2017, "Photovoltaic Solar Energy from Fundamentals to Applications", Wiley, India

4 [E-book]: Chetan Singh Solanki, 2013, Solar Photovoltaic Technology and Systems: A Manual for Technicians, Trainers and Engineers, PHI Learning Private Limited, Delhi.

5 https://youtu.be/zvTGWD533Xk?si=6hRjv-6DgiGNXQoS

6 https://www.youtube.com/watch?v=UVN1-SMyEDs

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6DE	ASTROPHYSICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental concepts of Space Physics.
- The stellar evolution.
- The theories of the Universe.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Understand basic astronomical instruments.	K2
CO2	RecallSolar systems.	K1
CO3	Explain birth and death of variable stars and binary stars.	K2
CO4	Outline stars and the measurement of stellar distance.	K2
CO5	Learn theories of universe, galaxies and star clusters.	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

222PY1A6DE	ASTROPHYSICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Astronomical Instruments **09 h**

Optical telescope - Reflecting telescope - Types of reflecting telescope - Advantages ofreflecting telescope - Radio telescopes - Astronomical spectrographs - Photographic photometry - Photo electric photometry - Detectors and imageprocessing.

Unit II Solar System **09 h**

The Sun- Physical and orbital data - Photosphere - Chromosphere - Corona - Solar prominences - Sunspot - Sunspot cycle - Theory of sunspots - Solar flare - Mass of theSun - Solar constant - Temperature of the Sun - Source of solar energy - Solar wind -Other members of the solar system - Mercury - Venus - Earth - Mars - Jupiter - Saturn- Uranus - Neptune - Pluto - Moon - Bode's law - Asteroids - Comets - Meteors.

Unit III Stellar Evolution, Binary and Variable Stars **10 h**

Birth of a star - Death of a star - Chandrasekhar limit - White dwarfs - Neutron stars- Black holes - Quasars - Nebulae - Supernovae - Binary stars - Origin of Binary stars - Variable stars - Cepheid variables - RV Tauri variables - Long period variables - Irregular variables - Flare stars.

Unit IV Magnitudes, Distance and Spectral Classification of Stars **10 h**

Magnitude and brightness - Apparent magnitude of stars - Absolute magnetic of stars - Relation between apparent magnitude and absolute magnitude of stars - Luminosities of stars - Measurement of stellar distance - Geometrical parallax method - Distance from red shift measurement - Harvard system of spectral classification.

Unit V Theories of the Universe, Galaxies and Star Clusters **10 h**

Origin of the universe - The big bang theory - The steady state theory - The oscillating Universe theory - Hubble's law - Galaxies - Types of galaxies - Milky Way - Star clusters - Open clusters - Globular clusters.

Text Books

1 Krishnasamy, K.S, 2017,"Space Science",New Age International Pvt Ltd, New Delhi.

2 BaidyanathBasu, 2018, "An Introduction to Astro physics", Prentice Hall of India Private limited, New Delhi.

References

1 Murugeshan, R, 2014, "Modern Physics", S.Chand and Co,New Delhi.

2 Padmanabhan, T, 2017, "Theoretical Astrophysics Volume 1: Astronomical Processes", Cambridge University Press, United Kingdom.

3 Padmanabhan, T, 2017, "Theoretical Astrophysics Volume 2: Stars and StellarSystems", Cambridge University Press, United Kingdom.

4 Padmanabhan, T, 2015, "New Challenges in Astrophysics", New Age International Private Limited, Kochi.

Course Code	Course Name	Category	L	T	P	Credit
222PY1A6DF	BIOMEDICAL INSTRUMENTATION	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The applications of various biomedical instruments.
- The fundamental concepts of monitoring systems and its applications.
- The concept of techniques in biomedical imaging.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the basic classifications of biomedical instruments.	K2
CO2	Identify the tools used in sensors and recorders.	K3
CO3	Demonstrate the mechanisms of monitoring systems.	K2
CO4	Apply the principle of clinical instruments	K3
CO5	Illustrate the concept of biomedical imaging techniques.	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

222PY1A6DF	BIOMEDICAL INSTRUMENTATION	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamentals of Instrumentation **10 h**

Medical instruments important considerations - Stethoscope and hearing enhancement - Alternative operational Modes - Medical measurement constraints - Classifications of biomedical instruments - Interfering and modifying inputs - Role of electronic circuit theory.

Unit II Biomedical Sensors and Recorders **9 h**

Sensor classifications - Blood gases and pH sensors - Oxygen measurement - pH electrodes - Carbon dioxide sensor - Bioanalytical sensors - Optical biosensors - ECG machine operation - ECG block diagram - EEG electrodes - EEG block diagram - EEG in diagnosis.

Unit III Monitoring Systems **10 h**

Modern system - Principles of indicator dilution method - Typical bedside monitor systems - Cardiotachometers - Harmonic analysis of blood pressure wave forms - Indirect measurements of blood pressure - Mechanism and origin - Measurement of gas volumes and flow rates.

Unit IV Clinical Instruments **9 h**

Operation of the clinical laboratory - Chemical electrodes - Blood gas analyzer - Blood cell counter - Radiation detectors - Semiconductor - radiation detectors - computer in clinical laboratory -selection of a computer system.

Unit V Biomedical Imaging Techniques **10 h**

Ultrasonic imaging - Image formation - CT scan - Electron beam computerized tomography - Applications of CT scanners - Magnetic resonance imaging - Polarization - Precession - Scanner hardware - Thermal imaging systems - Positron emission tomography.

Text Books

1 Scott K.N, Mathur A. K, 2007, "Textbook of Biomedical Instrumentation", CBS Publisher, New Delhi.

2 Mandeep Singh, 2014, "Introduction to Biomedical Instrumentation", PHI Publisher, New Delhi.

References

1 Fulekar M.H, 2013, "Bioinstrumentation", International Publishing House, New Delhi.

2 Pandey O.N, 2013, "Fundamentals of Biomedical Instrumentation" 3rd Edition, S. K. Kataria and Sons, New Delhi.

3 Deb A.C, 2011, "Fundamentals of Biochemistry", 3rd Edition, New Central Book Agency, India.

4 E-Book: John G. Webster, 2010, "Medical Instrumentation Application and Design", John Wiley and Sons Publication, India.

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

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE FOCUSES ON

✓	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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