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

REGULATIONS 2019-20 for Under Graduate Programme

(Outcome Based Education model with Choice Based Credit System)

B.Sc. Degree

(For the students admitted during the academic year 2019-20 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 thereto 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.

PROGRAM OUTCOMES:

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

PO Number	POStatement
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 learning for sustaining professional career.

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

Part	Subjects	No.of Papers	Credit	Semester No.
I	Tamil / Hindi / French/Malayalam	4	4 x 3 = 12	I, II, III & IV
II	English	4	4 x 3 = 12	I, II, III & IV
III	Core (Credits 2,3,4)	10	10 x 4 = 40	I to VI
	Core Practical	7	7 x 2 = 14	I to VI
	Inter Departmental Course (IDC)	4	4 x 3 = 12	I to IV
	Inter Departmental Course (IDC) Practical	2	2 x 2 = 4	III & IV
	Discipline Specific Elective (DSE)	3	3 x 4 = 12	V & VI
	Skill Enhancement Course(SEC)	4	4 x 3 = 12	III, IV, V & VI
	Generic Elective(GE)	2	2 x 2 = 4	III & IV
	Lab on Project (LoP)	1	1	III to V
IV	Environmental Studies(AECC)	1	2	I
	Value Education (VE) (Human Rights, Womens' Rights) (AECC)	2	4	II and III
	General Awareness(On-Line Exam) (AECC)	1	2	IV
	RM (AECC)	1	2	V
	Innovation, IPR, Entrepreneurship (AECC)	1	2	VI
	Project	1	4	VI
V	Extension Activity NSS / Sports / Department Activity	-	1	I to VI
		TOTAL CREDITS	**140**	-

CURRICULUM

B.Sc. PHYSICS PROGRAMME

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part - I										
191TL1A1TA/ 191HL1A1HA/ 191ML1A1MA/ 191FL1A1FA	Language - I	Tamil-I/ Hindi-I/ Malayalam-I/ French – I	4	1	-	3	25	75	100	3
Part - II										
191EL1A1EA	Language -II	English – I	4	-	1	3	25	75	100	3
Part - III										
192PY1A1CA	CORE	Properties of Matter and Sound	4	1	-	3	25	75	100	4
192PY1A1CB	CORE	Mechanics	4		-	3	25	75	100	4
192PY1A1CP	Core Practical	Properties of Matter and Mechanics	-	-	4	3	40	60	100	2
192MT1A1IA	IDC	Mathematics –I	4	1	-	3	25	75	100	3
Part - IV										
193MB1A1AA	AECC	Environmental studies	2	-	-	3	-	50	50	2
		Total	**22**	**3**	**5**				**650**	**21**

Course Code	Course Category	Course Name	L	T	P	Exm (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part - I										
191TL1A2TA// 191TL1A2HA / 191TL1A2MA / 191TL1A2FA	Language - I	Tamil-II/ Hindi-II/ Malayalam-II/ French – II	4	1	-	3	25	75	100	3
Part – II										
191EL1A2EA	Language-II	English – II	4	-	1	3	25	75	100	3
Part – III										
192PY1A2CA	CORE	Heat and Thermodynamis	4	1	-	3	25	75	100	4
192PY1A2CB	CORE	Atomic and Nuclear Physics	4	-	-	3	25	75	100	4
192PY1A2CP	Core Practical	Heat and Thermodynamics	-	-	4	3	40	60	100	2
192MT1A2IA	IDC	Mathematics - II	4	1	-	3	25	75	100	3
Part - IV										
196BM1A2AA	AECC	Human Rights	2	-	-	3	-	50	50	2
		Total	**22**	**3**	**5**				**650**	**21**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part - I										
191TL1A3TA / 191TL1A3HA / 191TL1A3MA / 191TL1A3FA	Language - I	Tamil-III/ Hindi-III/ Malayalam-III/ French – III	3	1	-	3	25	75	100	3
Part – II										
191EL1A3EA	Language-II	English - III	4	-	-	3	25	75	100	3
Part – III										
192PY1A3CA	CORE	Electricity and Electromagnetism	4	-	-	3	25	75	100	4
192PY1A3CP	Core Practical	Electricity and Magnetism	-	-	4	3	40	60	100	2
192CE1A3IA	IDC	Chemistry I	3	-	-	3	25	75	100	3
192CE1A3IP	IDC-Practical	Chemistry	-	-	4	3	40	60	100	2
192PY1A3SA	SEC	Electric Circuits and Networking Skills	3	-	-	3	25	75	100	3
	GE		2				-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A3AA/ 191TL1A3AB/ 195CR1A3AA	AECC	Basic Tamil / Advanced Tamil / Women's Rights	2	-	-	3	-	50	50	2
		Total	**22**	**-**	**8**				**800**	**24**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
Part - I										
191TL1A4TA/ 191TL1A4HA/ 191TL1A4MA/ 191TL1A4FA	Language-I	Tamil-IV/ Hindi-IV/ Malayalam-IV/ French – IV	3	1	-	3	25	75	100	3
Part – II										
191EL1A4EA	Language-II	English - IV	4	-	-	3	25	75	100	3
Part – III										
192PY1A4CA	CORE	Optics and Spectroscopy	4	-	-	3	25	75	100	4
192PY1A4CP	Core Practical	Optics and Spectroscopy	-	-	4	3	40	60	100	2
192CE1A4IA	IDC	Chemistry - II	3	-	-	3	25	75	100	3
192CE1A4IP	IDC Practical	Chemistry	-	-	4	3	40	60	100	2
192PY1A4SA	SEC	Basic Instrumentation Skills	3	-	-	3	25	75	100	3
	GE		2				-	50	50	2
	LoP	Lab on Project								
Part - IV										
191TL1A4AA/ 191TL1A4AB/ 192PY1A4AA	AECC	Basic Tamil / Advanced Tamil/ General Awareness	2	-	-	3	-	50	50	2
		Total	**22**	**-**	**8**				**800**	**24**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
Part – III										
192PY1A5CA	CORE	Mathematical methods	4	1	-	3	25	75	100	4
192PY1A5CB	CORE	Classical and Statistical methods	4	-	-	3	25	75	100	4
192PY1A5CC	CORE	Solid state Physics	4	-	-	3	25	75	100	4
192PY1A5CP	Core Practical	Solid state physics	-	-	4	3	40	60	100	2
192PY1A5CQ	Core Practical	Programming in C	-	-	4	3	40	60	100	2
192PY1A5SA	SEC	Principles of Programming Concepts and C Programming	3	-	-	3	25	75	100	3
192PY1A5DA/ 192PY1A5DB/ 192PY1A5DC	DSE	Geo Physics/ Astro Physics/ Medical Physics	4	-	-		25	75	100	4
192PY1A5LA	LoP	Lab on Project	-	-	-	-	50	-	50	1
192PY1A5TA	IT	Industrial Training	Grade A to C							
Part - IV										
192MT1A5AA	AECC	Research Methodology	2	-	-	3	-	-	50	2
		Total	**21**	**1**	**8**				**800**	**26**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part – III										
192PY1A6CA	CORE	Relativity and Quantum Mechanics	4	1	-	3	25	75	100	4
192PY1A6CP	Core Practical	Microprocessors and Digital Electronics	-	-	4	3	40	60	100	2
192PY1A6SA	SEC	Microprocessors and Digital Electronics	3	-	-	3	25	75	100	3
192PY1A6DA/ 192PY1A6DB/ 192PY1A6DC	DSE	Introduction to Nanoscience/ Fibre optics and Optoelectronics/ Lasers and Applications	4	-	-	3	25	75	100	4
192PY1A6DD/ 192PY1A6DE/ 192PY1A6DF	DSE	Materials Science/ Solar Photovoltaic Technology/ Biomedical Instrumentation	4	-	-	3	25	75	100	4
192PY1A6CV	Project	Project		-	8	3	40	60	100	4
Part - IV										
193BC1A6AA	AECC	Innovation, IPR and Entrepreneurship	2	-	-	3	-	-	50	2
Part - V										
192PY1A6XA		Extension Activity	-	-	-	-	50	-	50	1
		Total	**17**	**1**	**12**				**700**	**24**
								Grand Total	**4400**	**140**

DISCIPLINE SPECIFIC ELECTIVE

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

Semester V (Elective I)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192PY1A5DA	A. Geo Physics
2.	192PY1A5DB	B. Astro Physics
3.	192PY1A5DC	C. Medical Physics

Semester VI (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192PY1A6DA	A. Introduction to Nanoscience
2.	192PY1A6DB	B. Fibre optics and Optoelectronics
3.	192PY1A6DC	C. Lasers and Applications

Semester VI (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192PY1A6DD	A. Materials Science
2.	192PY1A6DE	B. Solar Photovoltaic Technology
3.	192PY1A6DF	C. Biomedical Instrumentation

GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective Course

Semester III (GE-I)

S. No.	Course Code	Course Name
1	192PY1A3GA	Everyday Physics - I

Semester IV (GE-II)

S. No.	Course Code	Course Name
1	192PY1A4GA	Everyday Physics - II

EXTRA CREDIT COURSES

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

S. No.	Course Code	Course Name
1	192PY1ASSA	Electrical and Electronic Appliances
2	192PY1ASSB	Biophysics and Biomedical Instrumentation

CERTIFICATE PROGRAMMES

The following are the programme offered to earn extra credits:

S. No.	Programme Code and Name	Course Code	Course Name
1	2PY5A: Certificate Course in Nanomaterials Preparation Techniques	192PY5A1CA	Nanomaterials Preparation Techniques
2	2PY5B: Certificate Course in Nanomaterials Characterization	192PY5B1CA	Nanomaterials Characterization

MOOC (NPTEL/SWAYAM/ SPOKEN TUTORIAL)

The following are the online courses offered:

Please refer the following link to select the courses

www.swayam.org

www.nptel.ac.in

www.spoken-totorial.org

REGULATION 2019-20

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

1. NOMENCLATURE

1.1 Faculty: Basic and Applied Sciences

1.2 Programme: Bachelor of Science in Physics

1.3 Batch: 2019 - 2022

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

a) **Core Courses**
Mechanics, Heat and Thermodynamics, Optics, Classical and Mathematical Physics, Relativity and Quantum Mechanics, Solid State Physics

b) **Inter Disciplinary Course (IDC)**
Maths and Chemistry

c) **Discipline Specific Elective (DSE) Course**:

Astro Physics, Medical Physics, Introduction to Nanoscience, Lasers and Applications, Materials Science, Solar Photovoltaic Technology

d) **Skill Enhancement Courses (SEC):** Electric Circuits and Networking Skills, Basic Instrumentation Skills, Principles of Programming Concepts and C Programming.

e) **Ability Enhancement Courses (AEC):** AECC courses are the courses based upon the content that leads to Knowledge enhancement. These are mandatory for all disciplines. Environmental Science, Human Rights, Women's Rights, General Awareness, IPR and Innovation, Entrepreneurship Development and Research Methodology.

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

1.5 Lab on Project (LoP)

To promote the undergraduate research among all the students, the LoP is introduced beyond their regular class hours. LoP is introduced as group project consisting of not more than five members. It consist of four stages namely Literature collection, Identification of Research area, Execution of research and Reporting / Publication of

research reports/ product developments. These four stages spread over from III to V semester.

1.6 Project work

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

Extra credits

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

Advanced Learner Course (ALC):

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

2. STRUCTURE OF PROGRAMME

2.1 PART – I: LANGUAGE

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

2.2 PART – II : ENGLISH

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

2.3 PART – III :

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

2.4 PART IV

2.4.1 Ability Enhancement Compulsory Course

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

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

(OR)

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

(OR)

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

2.5 PART V: EXTENSION ACTIVITIES

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

a) Institutional

- National Service Scheme (NSS)

  Participation in any one of the camps organized by NSS unit.

- Friends of Police(FoP)

  Active participation in traffic regulation and other extension activities

- Sports

  Active participation in any one of the sports activities

- Youth Red Cross (YRC)

  Active participation in YRC programmes

b) Department Association

Membership and active participation in the department association activities.

c) Clubs

Membership and active participation in any one club activities.

1. CREDIT ALLOTTMENT

The following is the credit allotment:

- **Lecture Hours (Theory)** **:** Max.1 credit per lecture hour per week,

1 credit per tutorial hour per week

- **Laboratory Hours** : 1 credit for 2 Practical hours per week.
- **Project Work** : 1 credit for 2 hours of project work per week

2. DURATION OF THE PROGRAMME

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

3. REQUIREMENTS FOR COMPLETION OF A SEMESTER

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

i) He/she secures **not less than 75%** of attendance in the number of working days during the semester.

ii) He/she earns a progress certificate from the Head of the institution, of having satisfactorily completed the course of study prescribed in the scheme of examinations for that semester as required by these regulations, and

iii) His/her conduct / character is satisfactory.

- Provided that it shall be open to the Academic council, or any authority delegated with such powers by the Academic council, to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed, for valid reasons, subject to usual conditions. (Refer the **Ordinance No.1 of 1990 of the Bharathiar University)**

- A candidate who earned 75% of attendance and more in the current semester are eligible to write the examination in current semester subjects.
- A candidate who has secured **less than 65% but 55%** and above attendance in any semester has to compensate the shortage in attendance in the subsequent semester besides earning the required percentage of attendance in that semester and appear for both semester papers together at the end of the later semester.
- A candidate who has secured **less than 55%** of attendance in any semester shall not be permitted to appear for the regular examinations and to continue the study in the subsequent semester. He/she has to rejoin the semester in which the attendance is less than 55%.

- A candidate who has secured **less than 65%** of attendance in the final semester has to compensate his/her attendance shortage in a manner as decided by the concerned Head of the department after rejoining the same course.

4. EXAMINATIONS

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

(i) Theory Courses

Continuous Internal Assessment (CIA) : **25** Marks

End Semester Exams (ESE) : **75** Marks

(ii) For Practical/ Courses

Continuous Internal Assessment (CIA) : **40** Marks

End Semester Exams (ESE) : **60** Marks

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

Continuous Internal Assessment for Practical Courses:

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

Project viva-voce / Industrial Training

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

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

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

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

Part – IV

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

6.1CONTINUOUS ASSESSMENT EXAMS

6.1 Theory courses

a) Continuous Internal Assessment test (CIA)

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

b) Utilization of Library

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

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

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

c) Class Participation

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

d) PAPERS / REPORTS/ ASSIGNMENTS/ CLASS PRESENTATION

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

Continuous Assessment OBE Rubrics Score Sheet

Degree: _____ Branch: _____ Semester: _____

Course Code: _____ Course: _____

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

S.No.	REG.NO	THEORY / PRACTICAL & LIBRARY CLASS PARTICIPATION (15) (Compulsory)	RUBRICS ASSESSMENT (SELECT ANY ONE)			out of : 30	Total Marks out of : 16 / 10 / 08 / 04
			PAPERS / REPORTS (15)	ASSIGNMENTS (15)	CLASS PRESENTATION (15)		

		Library	Integration of Knowledge	Interaction & Participation	Demonstration of Knowledge	Organization & Knowledge	Format & Spelling	Reference / Experiments	Demonstration of Knowledge	Format & Spelling	Reference	Content & Coherence	Creativity and Speaking Skills	Duration of Presentation		
		6	3	3	3	5	5	5	5	5	5	5	5	5		
1																

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

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

7. FOR PROGRAMME COMPLETION

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

Student has to complete the following:

i) Part I, II,III,IV,V as mentioned in the scheme

ii) **Industrial/ Institutional training**

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

Based on the performance Grade will be awarded as follows:

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

iii) Skill Enhancement Training

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

8. EXTRA CREDITS

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

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

8.1 Proficiency in foreign language

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

8.2 Proficiency in Hindi

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

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

8.3 Self study Course

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

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

8.4 Typewriting/Short hand

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

Qualification	**Credit**

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

8.5 Diploma / Certificate

Courses offered by any recognized University / NCVRT

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

8.6 CA/ICSI/CMA

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

8.7 Sports and Games

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

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

8.8 Online Courses

Pass in any one of the online courses

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

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

Course Code	Course Name	Category	L	T	P	Credit

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

8.10 Innovation / Incubation / Patent / Sponsored Projects / Consultancy

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

8.11 Representation

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

CURRICULUM

B.Sc. PHYSICS PROGRAMME

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part - I										
191TL1A1TA/ 191HL1A1HA/ 191ML1A1MA/ 191FL1A1FA	Language - I	Tamil-I/ Hindi-I/ Malayalam-I/ French – I	4	1	-	3	25	75	100	3
Part - II										
191EL1A1EA	Language -II	English – I	4	-	1	3	25	75	100	3
Part - III										
192PY1A1CA	CORE	Properties of Matter and Sound	4	1	-	3	25	75	100	4
192PY1A1CB	CORE	Mechanics	4		-	3	25	75	100	4
192PY1A1CP	Core Practical	Properties of Matter and Mechanics	-	-	4	3	40	60	100	2
192MT1A1IA	IDC	Mathematics –I	4	1	-	3	25	75	100	3
Part - IV										
193MB1A1AA	AECC	Environmental studies	2	-	-	3	-	50	50	2
		Total	**22**	**3**	**5**				**650**	**21**

Course Code	Course Name	Category	L	T	P	Credit
191TLIA1TA	தமிழ்த் தாள் - I	மொழி- I	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TLIA1TA	தமிழ்த்தாள் - I	SEMESTER I

Total Credits: 03

Total Instruction Hours: 60 h

Syllabus

Unit I மறுமலர்ச்சிக் கவிதைகள் 12 h

1. உயிர் பெற்ற தமிழர் பாட்டு - பாரதியார்
2. படி - பாரதிதாசன்
3. போராடப் புறப்பட்டோம் - தமிழ் ஒளி
4. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை
5. திரைத்தமிழ்

அ) சும்மா கிடந்த நிலத்தை எனத்தொடங்கும் பாடல் -

_ பட்டுக்கோட்டை கல்யாண சுந்தரனார்

ஆ) சமரசம் உலாவும் இடமும் எனத்தொடங்கும் பாடல் - மருதகாசி

இ) உன்னை அறிந்தால் எனத்தொடங்கும் பாடல் - கண்ணதாசன்

Unit II புதுக்கவிதைகள் 12 h

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

Unit III பெண்ணியம் 08 h

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

Unit IV சிறுகதைகள் 15 h

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

Unit V இலக்கியவரலாறு, இலக்கணம் மற்றும் பயிற்சிப் பகுதி 13 h

அ. இலக்கிய வரலாறு

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

ஆ. இலக்கணம்

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

இ. படைப்பாக்கப் பயிற்சி

1. கவிதை, சிறுகதை எழுதுதல்

Text Books

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

References

1 பேராசிரியர் முனைவர் பாக்கியமேரி. இலக்கணம் இலக்கிய வரலாறு மொழித்திறன். முதல் பதிப்பு 2013 . பூவேந்தன் பதிப்பகம். சென்னை

2 தமிழண்ணல் . புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு . பதினாறாம் பதிப்பு 2000 மீனாட்சி புத்தக நிலையம். மதுரை.

3 பேராசிரியர் புலவர் இளவரசு ,சோம. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு. எட்டாம் பதிப்பு ஜூலை 2012.மணிவாசகர் பதிப்பகம்.சென்னை

4 தமிழ் இணையக் கல்விக்கழகம். <http://www.tamilvu.org/ >

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

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191EL1A1EA	ENGLISH - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I Genre Studies - I 10 h

The Road Not Taken – Robert Frost
All the World's a Stage – William Shakespeare
Whitewashing the Fence – Mark Twain
The Face of Judas Iscariot - Bonnie Chamberlain
Soul Gone Home – Langston Hughes

Unit II Genre Studies - II 11 h

Ode on a Grecian Urn – John Keats
Mending Wall – Robert Frost
My Early Days – Dr. A.P.J. Abdul Kalam
Nightfall – Isaac Asimov
A Kind of Justice – Margret Atwood

Unit III Grammar - I 14 h

Parts of Speech
Articles and Prepositions
Subject Verb Agreement
Degrees of Comparison
Sequence of Tenses

Unit IV Genre Studies - III 11 h

On his Blindness - John Milton
Small - Scale Reflections on a Great House – A.K. Ramanujan
On Prayer – Khalil Gibran
The Garden Party – Katherine Mansfield
The Tell - Tale Heart – Edgar Allen Poe

Unit V Grammar - II 14 h

If Conditionals

Modal Auxiliary Verbs

Question Types/Tags

Voice

Direct and Indirect Speech

Text Books

1 Prabha, Vithya. R and S. Nithya Devi. 2019. Sparkle: English Textbook for First Year. McGraw Hill Education, Chennai.

2 Wren and Martin. 2006. High School English Grammar and Composition. S. Chand Publishing, New Delhi.

References

1 Bajwa and Kaushik. 2010. Springboard to Success- Workbook for Developing English and Employability Skills. Orient Black Swan, Chennai

2 Syamala. V. 2002. Effective English Communication for You. Emerald Publishers, Chennai.

3 Krishnaswamy. N, Lalitha Krishnaswamy & B.S. Valke. 2015. Eco English, Learning English through Environment Issues. An Integrated, Interactive Anthology. Bloomsbury Publications, New Delhi.

4 Krishnaswamy. N. 2000. Modern English: A Book of Grammar, Usage And Composition. Macmillan, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A1CA	PROPERTIES OF MATTER AND SOUND	THEORY	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.	K3
CO3	Explain the basics of viscosity and compare it using different methods.	K2
CO4	Show experiments in explaining basics of sound waves using sonometer.	K2
CO5	Summarize the production, detection, properties and uses of ultrasonic waves.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A1CA	CORE : PROPERTIES OF MATTER AND SOUND	**SEMESTER I**

Total Credits: 4
Total Instructions Hours: 60 h

Syllabus

Unit I Elasticity 14

Stress, Strain - Hooke's law – Elastic moduli – Poisson's ratio – bending of beams – Expression for bending moment –Determination of young's modulus by uniform bending method – Torsion of a body – Expression for couple per unit twist – Work done in twisting a wire – Torsional oscillations of a body - Rigidity modulus by dynamic torsion method (Torsional pendulum)

Unit II Surface tension 10

Molecular forces – Explanation of surface tension on kinetic theory – Surface energy – Excess pressure inside a curved liquid surface –Capillary rise method-Variation of surface tension with temperature- Jaegar's method.

Unit III Viscosity 12

Co efficient of viscosity – Critical velocity – Rate of flow of liquid in a capillary tube – Poiseuille's formula –Viscosity of highly viscous liquid -Stokes formula- Viscosity of gases– Meyer's Modification of Poiseuille's formula-Rankine's method.

Unit IV Sound 11

Simple Harmonic Motion – Progressive waves – Properties – Composition of two S.H.M – Beats – Stationary waves – Properties - Laws of transverse vibration in a string- Sonometer experiment for the frequency of tuning fork.

Unit V Ultrasonics and Acoustics 13

Ultrasonics –Production – 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 R. Murugesan, Kirrthika Sivaprasath. 2012. Properties of matter and Acoustics, 2nd edition. S.Chand and Co, New Delhi.

2 Brij Lal and N. Subrahmanyam. 2003. Properties of Matter, S.Chand and Co, New Delhi

References

1 Robert Resnick, David Halliday and Kenneth S.Krane. 2001. Physics, Vol. 1, 5th Edition. Wiley India.

2 N. Subramanyam, Text book of Sound, Vikas publications.

3 M. Ghosh, 1984, A Text books of Sound, Chand and Co, New Delhi

4 D.S. Mathur. 2008. Elements of Properties of Matter, S. Chand and Co, New Delhi.

5 R.P. Feynman, R B Leighton and M Sands. 1998. The Feynman Lectures on Physics, Vol I,II and III, Narosa, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A1CB	MECHANICS	THEORY	3	1	-	4

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 along with the necessary mathematics for solving numerical.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Summarize the fundamental laws of mechanics and apply them to solve problems	K2
CO2	Utilize the principles of Moment of Inertia and do experiments in laboratories.	K3
CO3	Illustrate gravitational field, potential and Kepler's Law.	K2
CO4	Solve the problems in central force motions and interpret it through derivational values.	K3
CO5	Demonstrate the importance of hydro dynamical functions and its applications.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A1CB	CORE : MECHANICS	**SEMESTER I**

Total Credits: 4
Total Instructions Hours: 48 h

Syllabus

Unit I Collisions 9

Conservation law of linear momentum –Collision – Definition and types of collisions - Elastic and in elastic collision - Elastic collisions in one dimension – special cases –Collisions in two dimensions - Illustration with examples of collisions during accidents and collisions at atomic and sub-atomic level.

Unit II Dynamics of rigid body 11

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 9

Newton's law of gravitation – G by Boy's method – Mass and density of earth – Acceleration due to gravity – Variation of g with altitude, depth and rotation of earth.

Gravitational potential – Kepler's law of gravitation - Energy of orbiting satellite – Einstein and Gravity (Principle of Equivalence).

Unit IV Central Force Motion 10

Torque and angular acceleration – Relation between then – Expression for a acceleration of a body rolling down an inclined body without slipping - Center of mass –Velocity and acceleration of centre of mass – Determination of motion of individual particle– System of variable mass - Rocket motion.

Unit V Statics and Hydrodynamics 9

Friction-laws of friction-Experimental method for determining coefficient of friction –Hydrodynamics - Equation of continuity of flow – Bernoulli's theorem and its applications – Venturimeter.

Text Books

1. D.S. Mathur. 2014. Mechanics, S. Chand and Co, New Delhi
2. Halliday, D., Resnick, R., and Walker, J. Fundamentals of Physics, 9th edition. Wiley.

References

1. P. Duraipandian. 2005. Mechanics, 6th edition. S. Chand and Co, New Delhi.
2. R. Murugesan. 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.
4. R.P. Feynman, R.B.Leighton and M.Sands. 1998. The Feynman Lectures on Physics, Volumes 1 & 2, Narosa Publishing House.
5. R. Murugesan. 2014. Mechanics and Mathematical Physics, S.Chand and Co, New Delhi.

192PY1A1CP	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	Sonometer – Frequency of AC current
10	Determination of Rigidity modulus of a string.
11	Determination of moment of Inertia of a body.
12	Study of the motion of a freely falling body.
13	Compound Pendulum – Determination of 'g' and 'K'.
14	Young's Modulus – Cantilever-Dynamic method.
15	Young's Modulus – Cantilever-Static method.

References

1. D. Chattopadhyay. Advanced course in practical physics, NCBA publishers.
2. Samir kumar ghosh. Textbook of Advanced Practical Physics, NCBA publishers.
3. C.L. Arora. B.Sc. Practical Physics, S.Chand.
4. Sathya Prakash. Practical physics and Electronics, S.Chand
5. B.D. Gupta. Textbook of Advanced Practical Physics, Vikas publishers.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A1IA	MATHEMATICS - I	IDC	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The methods of solving differential equations
- The various forms of Partial differential equations, its existence and solution methods.
- The Laplace Transforms and its application.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Describe differential equations.	K2
CO2	Describe the existence of a partial differential equations	K2
CO3	Explain the concepts of Linear partial equations of order one	K2
CO4	Compute the Laplace transform of some function Transforms	K3
CO5	Apply inverse Laplace Transforms to solve differential equations.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192MT1A1IA	IDC : MATHEMATICS I	SEMESTER I

Total Credits: 3

Total Instructions Hours: 60 **H**

Syllabus

Unit I Differential Equations **10 H**

Definition –Ordinary differential equation- Partial differential equation- Order of a differential equation- degree of a differential equation – Linear and Non linear differential equations – solution of a differential equation-Family of curves – Formation of differential equation.

Unit II Partial differential equations **12 H**

Introduction - Partial differential equation definition-Order of a Partial differential equation-degree of a Partial differential equation-Linear and nonlinear Partial differential equation-Classification of first order Partial differential equations- Rule I:Derivation of Partial differential equations by the elimination of arbitrary constants-Rule II: Derivation of Partial differential equations by the elimination of arbitrary functions from the equation $\Phi(u,v)=0$,where u and v are functions of x,y and z-Cauchy's problem for first order equations-Objective problems.

Unit III Linear Partial equations of order one **12 H**

Lagrange's equations-Lagrange's method of solving Pp+Qq=R-Working rule for solving Pp+Qq=R by Lagrange's method-Example based on working rule-Type 1 based on rule I - Type 2 based on rule II - Type 3 based on rule III -Type 4 based on rule IV -Miscellaneous examples based on Pp+Qq=R – Integral surfaces passing through a given curve – The Cauchy problem -Solved examples.

Unit IV Laplace Transform **14 H**

Introduction – Integral Transform. Definition – Definition of Laplace Transform – Piecewise continuous functions – Functions of exponential order – Functions of class A – Sufficient condition for existence of Laplace Transform –Linearity Property of Laplace Transforms – Table of Laplace Transforms – First Translation Theorem – change of scale property-Laplace transforms of derivatives-Multiplication by positive integral powers of t-division by t theorem- Laplace transforms of integrals-Initial and final value theorems-Laplace transform of periodic functions-Evaluation of integrals by using Laplace transforms-Laplace transforms of some special functions.

Unit V Inverse Laplace Transform **12 H**

Inverse Laplace Transform of elementary functions-Linearity property of inverse Laplace Transform –-first translation theorem- second translation theorem- change of scale property- inverse Laplace Transform of derivatives- inverse Laplace Transform of integrals-Multiplication by powers of p –Convolutions of two functions-The convolution theorem-The Fourier integral theorem- -Some useful results of complex variable theory-Working rule for finding inverse Laplace Transform. Solution of PDE subject to boundary conditions-Boundary value problems.

Text Books

1 M.D.Raisinghania, Ordinary and Partial Differential Equations. 2014.S.Chand & co,New Delhi.

2 M.D.Raisinghania, Integral Transforms. 2002. S.Chand & co, New Delhi.

References

1 Shanti Narayan, Differential & Integral Calculus. 2002.S.Chand & co, New Delhi.

2 Erwin Kreyszig, Advanced Engineering Mathematics, 2005, Wiley India Pvt Ltd, New Delhi,

3 B.S.Grewal, Higher Engineering Mathematics, 2014, Khanna Publishers

4 Nita H.Shah, Ordinary and Partial Differential Equations Theory and Applications, ,(2015 Prentice Hall of India) New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
191TLIA2TA	**தமிழ்த்தாள் - II**	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TLIA2TA	தமிழ்த்தாள் - II	SEMESTER II

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I அற இலக்கியம் **12 h**

1. திருக்குறள்

அ.அறன் வலியுறுத்தல் (அ. எண்: 04)

ஆ.நட்பாராய்தல் (அ. எண்: 80)

இ.சான்றாண்மை (அ. எண்: 99)

ஈ.குறிப்பறிதல் (அ. எண்: 110)

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

Unit II அற இலக்கியம் **10 h**

1. நாலடியார் - அறிவுடைமை

2.பழமொழி நானூறு - வீட்டு நெறி

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

Unit III உரைநடை **10 h**

1. பெற்றோர்ப் பேணல் - திரு.வி.க.

2. உள்ளம் குளிர்ந்தது - மு.வரதராசனார்

3. சங்கநெறிகள் - வ.சுப.மாணிக்கம்

Unit IV உரைநடை **13 h**

1.பெரியார் உணர்த்தும் சுயமரியாதையும் சமதர்மமும் - வே. ஆனைமுத்து

2. வீரவணக்கம் - கைலாசபதி

3.மொழியும்நிலமும் - எஸ். ராமகிருஷ்ணண்

Unit V இலக்கிய வரலாறு, இலக்கணம் மற்றும் பயிற்சிப்பகுதி **15 h**

அ.இலக்கிய வரலாறு

1. பதினெண் கீழ்க்கணக்கு நூல்கள்

2. தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்

ஆ. இலக்கணம்

1. வழு, வழுவமைதி, வழாநிலை

இ. பயிற்சிப்பகுதி

1. நூல் மதிப்பீடு மற்றும் திரைக்கதை திறனாய்வு

2. தன்விவரக் குறிப்பு எழுதுதல்

Text Books

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

References

1 பேராசிரியர் புலவர் இளவரசு, சோம. (ஜூலை2012). தமிழ் இலக்கிய வரலாறு. (எட்டாம் பதிப்பு) சென்னை: மணிவாசகர் பதிப்பகம்.

2 பேராசிரியர் முனைவர் பாக்கியமேரி (2013). இலக்கணம் இலக்கிய வரலாறு மொழித்திறன். (முதல் பதிப்பு) சென்னை பூவேந்தன் பதிப்பகம்.

3 தமிழ் இணையக் கல்விக்கழகம் <http://www.tamilvu.org/>

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2HA	HINDI-II	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A2HA	HINDI-II	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I — 15 h

आधुनिकपद्य – शबरी(श्रीनरेशमेहता)

प्रकाशक: लोकभारतीप्रकाशन

पहलीमंजिल, दरबारीबिल्डिंग,

महात्मागाँधीमार्ग, इलाहाबाद-**211001**

Unit II — 15 h

उपन्यास: सेवासदन-प्रेमचन्द

प्रकाशक: सु मत्रप्रकाशन

204 लीलाअपार्ट्मेंट्स, **15** हेस्टिंग्सरोड'

अशोकनगरइलाहाबाद-**211001**

Unit III — 15 h

अनुवादअभ्यास-**III (**केवलहिन्दीसेअंग्रेजीमें**)**

(पाठ**1 to 10)**

प्रकाशक: द क्षणभारतप्रचारसभाचेनैई-**17**

Unit IV — 15 h

पत्रलेखन: (औपचारिकयाअनौपचारिक)

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2FA	FRENCH- II	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A2FA	FRENCH- II	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I – Super! 13 h

•Compétenc e Culturelle

L'égalitéhomme/femme

Compétence De communication

INTERACTION:

Exprimer des sentiments, exprimer la joie, le plaisir, le bonheur

- RÉCEPTION ORALE:

Comprendre un jeuradiophonique

- RÉCEPTION ÉCRITE:

Comprendre des announces

- PRODUCTION ÉCRITE:

Écrire des cartespostales •

Compétencegrammaticale

Les noms de professions masculine/feminine

- Le verb finir et less

Verbes du groupe

en-ir

- Le present de l'impératif
- Savoir(present)
- Le participle passé:

Fini, aimé, arrive, dit,écrit

- Quel(s), quelle(s)..:

InterrogatifetExclamatif

- À + infinitive
- Les articles: n,une,des

Unit II Quoi? 13 h

Compétenc e Culturelle

- Le 20 siécle:

Petitsprogrés Grand progrés

Compétence De communication

- INTERACTION:

Decrirequelque chose, unepersonne

- RECEPTION ORALE:

Comprendre un message publicitaire

- RÉCEPTION ÉCRITE:

Comprendre un déplianttouristique

- PRODUCTION

ÉCRITE: Écrire des petites announces

Compétence grammatical

- On
- Plus, moins
- Le verbealler:
- Present, impératif
- Aller + infinitife
- Le pluriel en –x

Unit III – Et aprés 12 h

Compétenc e Culturelle

Nouvelles du jour

Compétence De communication

INTERACTION:

Raconteur,situer un récitdans le temps

RÉCEPTION ORALE:

Comprendreune description

RÉCEPTION ÉCRITE:

Comprendre un test

PRODUCTION ÉCRITE:

écrire des cartespostales

Compétencegrammaticale

L'imparfait:: quel-Ques forms pour introduire le récit:Ilfaisait, il y avait, ilÉtait

Un peu, beaucoup, trop,Assez

Trés

Le verbevenir:

Présent, impératif

En Suisse, auMaroc, aux Etats-Unis

Unit IV Maisoui! 12 h

Compétenc e Culturelle

La génération des20-30 ans

Compétence De communication

INTERACTION:

Donner son opinion,

Expliquerpourquoi

RÉCEPTION ORALE:

Comprendre des informations à la radio

RÉCEPTION ÉCRITE:

Comprendre un texteinformatif

PRODUCTION ÉCRITE:

éncrire un mél de protestation

Compétencegrammaticale

Répondre, prendre:

Présent, impératif, part Passé

Parcequepourquoi

Tout/tous, toute/s

Tous/toutes les…

(répétition action)

Unit V Maisnon! 10 h

•Compétenc e Culturelle

De la ville à la campagne

Compétence De communication

INTERACTION:

Débat:: exprimerl'accord, exprimer le Désaccord

RECEPTION ORALE:

Comprendre un message sur un répondeurtéléphonique

RÉCEPTION ÉCRITE:

Comprendre un témoignage

PRODUCTION ECRITE: Rediger des petites Announces immobilieres

Compétencegrammaticale

Le verbedevoir:Present et participe passé

Le verbe vivre, present

Aller + infinitive

Venir+ infinitive

Etre pour/contre

Text Books

1 Marcella Di Giura Jean-Claude Beacco, AlorsINew Delhi – 110007:Goyal Publishers Pvt Ltd86, University Block Jawahar Nagar (Kamla Nagar).

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2MA	MALAYALAM-II PROSE: NON-FICTION	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A2MA	MALAYALAM-II PROSE: NON-FICTION	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I 12 h

Biography

Unit II 12 h

Biography

Unit III 12 h

Travelogue

Unit IV 12 h

Travelogue

Unit V 12 h

Travelogue

Text Books

1. Unit III, IV &V:Pottakkadu,S.K. KappirikaludeNattil. Kottayam: D.C. Books.
2. Bhatathirippadu,V.T.KannerumKinavum. Kottayam: D.C. Books.

References

1. Dr. George,K.M.(). Jeevacharitrasahithyam. (Edn.) Kottayam: N.B.S.
2. Dr. NaduvattomGopalakrishnan.JeevacharitrasahithyamMalayalathil. Trivandrum:Kerala BhashaInstitute.
3. Dr. VijayalamJayakumar. AthmakathasahithyamMalayalathil. (Kottayam:N.B.S.
4. Prof. Ramesh Chandran.SancharasahithyamMalayalathil. (10 Edn.) Trivandrum: Kerala Bhasha Institute.

Course Code	Course Name	Category	L	T	P	Credit
191EL1A2EA	ENGLISH - II	Language - II	4	0	1	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Interpret skills in communication and to shape their attitude	K2
CO2	Develop oral and written language skills in a business context	K3
CO3	Analyze to gain key strategies and expressions for communicating with professionals	K4
CO4	Inspect the knowledge to the corporate needs	K4
CO5	Formulate Inter and Intrapersonal skills	K6

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191EL1A2EA	ENGLISH - II	SEMESTER II

Total Credits: 3
Total Instructions Hours: 60

Syllabus

Unit I Technical English 10

Communication: Process- Methods- Channels- Barriers of Communications

Phonetics: Basics of phonetics - Consonants and Vowel sounds - Pronunciation Guidelines- Problem Sounds and Differences in Pronunciation

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

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

Unit II Business English 11

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

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

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

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

Unit III Professional English 14

Report Writing: Importance- Process- Types- Structure

Memo: Importance- Structure

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

Brochures: Purpose- Audience- Qualities

Unit IV Employment Communication 11

Resume Writing : Elements of Resume - difference between CV and Resume - Writing Job Application Art of Conversation: Small Talk- Body Language- Principles of Good Conversation Interview: Organizational role- Goals- Types- Interview Process

Group Discussion: Importance- Features- Strategies- Barriers

Unit V Soft Skills 14

Self - Discovery and Goal Setting: Self - Discovery - What Comprises It?- Goals and Types- Benefits, Areas and Clarity of Goal Setting - Critical thinking

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

Etiquettes and Manners: Home, Table and Business- Time Management: Nature and Characteristics- Objectives and Significance

Developing Emotional Intelligence (EI): Salient Features- Components of EI- Intrapersonal Development

Text Books

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

2 Rizvi, Ashraf. M. 2018. Effective Technical Communication. McGraw - Hill Education, Chennai.

References

1 Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw - Hill Education, Chennai.

2 Adams, Katherine L. and Gloria I. Galanes. 2018. Communicating in Groups- Applications and Skills. McGraw - Hill Education, Chennai.

3 Koneru, Aruna. 2017. Professional Communication. McGraw - Hill Education, Chennai.

4 Koneru, Aruna. 2011. English Language Skills. McGraw - Hill Education, Chennai.

5 Sharma, R.C. and Krishna Mohan. 2016. Business Correspondence and Report Writing. 5th Edn. McGraw - Hill Education, Chennai.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A2CA	HEAT AND THERMODYNAMICS	CORE	4	1	-	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 properties.
- The thermometric, calorimetric theory and applications

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Outline of Kinetic theory of gases, its concepts and their applications	K2
CO2	Compare Thermodynamic and Statistical principles	K2
CO3	Utilize the Third Law of Thermodynamics and concepts of Entropy.	K3
CO4	Demonstrate the phenomena of Thermometry and its measurement	K2
CO5	Determine the specific heats of liquid and heat capacities	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A2CA	CORE : HEAT AND THERMODYNAMICS	**SEMESTER** II

Total Credits: 4
Total Instruction Hours: 48 h

Syllabus

Unit I Kinetic Theory of Gases 10 h

Concept of Ideal gas – Derivation of gas laws – Degrees of freedom - Maxwell's Law of Equipartition of energy – Van der waals equation of state : Correction for Pressure and Correction for Volume – Joule Kelvin Effect : Temperature of Inversion.

Unit II Thermodynamics 9 h

Zeroth Law of Thermodynamics – Concept of Heat - First law of Thermodynamics – Specific heats of a gas – Adiabatic process - Isothermal process – Determination of γ by Clement and Desorme's method – Second law of thermodynamics –Carnot's Theorem.

Unit III Entropy and Transmission of Heat 10 h

Entropy of a perfect gas - Third law of Thermodynamics - Zero Point Energy – Co-efficient of thermal conductivity – Cylindrical flow of heat –Thermal conductivity of rubber – Thermal conductivity of glass - Thermopile – Properties of thermal radiation.

Unit IV Thermometry 12 h

Concept of Heat and Temperature – Types of thermometers – Platinum Resistance Thermometer – Callendar and Griffith's bridge - Peltier effect – Low Temperature Measurement – High Temperature Measurement.

Unit V Calorimetry 12 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.

Text Books

1. Brij Lal, Subrahmanyam,N. (2014). Heat Thermodynamics and Statistical Physics.. (5th Edn.) Delhi: S Chand and Co.

References

1. Holman,J.P. (2015). Heat Transfer (IN SI UNITS). (10th Edn.) New Delhi: S Chand and Co.
2. Mathur,D.S. (2002). Heat and Thermodynamics. (2nd Edn.) New Delhi: S Chand and Co.
3. Kakani, S.L. (2009). Heat Thermodynamics And Statistical Physics. (2nd Edn.) New Delhi.: S Chand and Co.
4. Murughesan,R. (2008). Thermal Physics. (2nd Edn.) New Delhi: S Chand and Co.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A2CB	ATOMIC AND NUCLEAR PHYSICS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concept of atomic physics and nuclear physics with radioactivity nature
- The fine structure of spectral lines, x-rays and photo electric effect
- The 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	Explain the concept of positive rays and vector atom model	K2
CO2	Identify the fine spectral notation of the atoms	K3
CO3	Demonstrate the x-ray and photoelectric effect with atoms	K3
CO4	Outline of nuclear forces and radioactivity	K2
CO5	Construct the kinematics of nuclear reaction and elementary particles	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A2CB	CORE : ATOMIC AND NUCLEAR PHYSICS	**SEMESTER II**

Total Credits: 4
Total Instruction Hours: 48 h

Syllabus

Unit I Positive Rays and Vector Atom Model 10 h

Discovery – Properties of positive rays - Thomson's parabola method – Aston's mass spectrograph – Bainbridge's mass spectrograph - Basic concept of Rutherford atom model, Bohr atom model, Sommerfelds atom model, Vector atom model - Coupling schemes - L-S Coupling- j-j Coupling

Unit II Fine Structure of Spectral Lines 10 h

Spectral terms - Spectral notation - Selection rules - Intensity rules - Interval rule - Fine structure of sodium D line - Alkali spectra - Fine structure of alkali spectra - Spectrum of helium - Normal Zeeman effect theory and experiment - Larmor's theorem - Paschen-Bach effect - Stark effect.

Unit III X-Rays and Photo Electric Effect 10 h

Production of X-rays – Absorption of X-rays – Bragg's law – Bragg's X-ray spectrometer – Origin and analysis of continuous and characteristic spectra - Moseley's law and its importance - Einstein's photoelectric equation - Photoelectric cells – Photo emissive cells - Photovoltaic cells - Photoconductive cells - Applications of photoelectric cells.

Unit IV Nuclear Physics and Radioactivity 9 h

General properties of nucleus - Binding energy – BE/A curve – Nuclear Force - Meson theory of nuclear forces – Liquid drop model – Nuclear shell model - Theory of α, β and ϒ decay - Properties of α, β and ϒ rays - Neutrino and its properties - Nuclear isomers - Radioisotopes and its uses.

Unit V Nuclear Reactions and Elementary Particles 9 h

Kinematics of nuclear reaction - Nuclear fission – Nuclear fusion – Nuclear Reactor - Atom bomb - Hydrogen bomb - Artificial transmutation - Classification of elementary particles – Photons – Baryons – Mesons and leptons – Quark model.

Text Books

1. Murugeshan,R (2014). Modern Physics. (17th Edn.) Delhi: S. Chand &Co.,.
2. Aruldhas,G (2005). Modern Physics. (10Edn.) Location: Prentice Hall, India learning private limited.

References

1. Tayal, D.C. (Year). Nuclear Physics. (2nd Edn.) Mumbai: Himalaya Publishing House.
2. Subrahmanyam and Brijlal, (2014). Atomic and Nuclear Physics. (5th Edn.) Delhi: S.Chand & Co .
3. Ghoshal,S.N. (2010). Atomic Physics. (10 Edn.) Delhi: S. Chand &Co.
4. V.K.Mitatal, R.C.Verma (2018). Introduction to Nuclear and Particle Physics. (4th Edn.) Location: PHI Learning.

192PY1A2CP	CORE PRACTICAL : HEAT AND THERMODYNAMICS	**SEMESTER II**

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Determination of thermal conductivity of a bad conductor by using Lee's Disc method
2	To find the band gap energy of a semiconductor
3	Determination of Specific Resistance of a material - Meter Bridge
4	To determine the Stefan's constant
5	To find the solar constant by pyrheliometer
6	Construction and working of IC regulated power supply
7	To determine the low range Ammeter calibration - Potentiometer
8	To determine the low range Voltmeter calibration - Potentiometer
9	To determine the refractive index of the Prism – Spectrometer
10	To find the wavelength of grating – Spectrometer

Note Any 8 Experiments

References

1. D. Chattopadhyay. Advanced course in practical physics, NCBA publishers.

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

3. C.L. Arora. B.Sc. Practical Physics, S.Chand.

4. Sathya Prakash. Practical physics and Electronics, S.Chand

Course Code	Course Name	Category	L	T	P	Credit
192MT1A2IA	MATHEMATICS-II	IDC	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The measures of central tendency, correlation and regression
- The axioms of probability
- The concept and applications of probability distribution and curve fitting

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify the problem solving techniques measures of central tendency	K3
CO2	Interpret the concepts of Correlation and Regression.	K2
CO3	Illustrate the Axioms of Probability and Conditional Probability	K2
CO4	Apply the knowledge of Probability distribution	K3
CO5	Solve the concept of Curve Fitting.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192MT1A2IA	IDC : MATHEMATICS-II	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I Measures of Central Tendency and Measures of Dispersion 12 h

Averages or Measures of Central Tendency – Arithmetic Mean – Geometric Mean– Harmonic Mean –Median–Mode-Measures of dispersion- Meaning and Necessity of Measures of Dispersion- Range – Quartile deviation –Standard deviation- Important properties of Standard deviation-Calculation of S.D

Unit II Correlation and Regression 12 h

Concepts of correlation and regression – Bivariate data – Bivariate frequency Distribution – Scatter Diagram – Correlation – Covariance –Correlation Coefficient – Properties of Correlation Coefficient – Calculation of r –Regression – Properties of Linear Regression – Rank Correlation.

Unit III Theory of Probability 14 h

Introduction– Random Experiment, outcome, event–Important Terminology – Techniques of counting – Classical definition of probability – Theorems of Probability – Drawing without replacement – Repeated Trails: Drawing without replacement

Unit IV Theoretical Distributions 12 h

Random Variable and probability distribution –Discrete probability distribution- Expectations- Mean, variance, Moments -Uniform distribution – Binomial distribution – Poisson distribution- Continuous probability distribution-Normal distribution

Unit V Curve Fitting and Method of Least Squares 10 h

Curve fitting - Fitting of Straight line- Fitting of Second degree Parabola -Free hand Method of curve fitting -Method of Least squares- Simplified calculations - Fitting of Exponential and Geometric curves

Text Books

1 DasN.G, (2017). Statistical Methods Combined Edition (Volume I and Volume II. (16th Edn.) New Delhi: TATA McGraw Hill Education.

References

1 Pillai Bagavathy , R.S.N. (2010). Statistics. (10th Edn.) New Delhi : S Chand and Co .

2 Das ,N.G. (2012). Business Mathematics and Statistics. (16th Edn.) New Delhi: TATA McGraw Hill Education .

3 Gupta,S.P. (2017). Statistical Methods. (16th Edn.) New Delhi: S Chand and Co..

4 Sheldon Ross ,S.N. (2017). A First Course in Probability. (5th Edn.) New Jersey: Prentice Hall.

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

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong **M Medium** **L Low**

196BM1A2AA	AECC : HUMAN RIGHTS	**SEMESTER II**

Total Credits: 2
Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to human values 05 h

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

Unit II Value education and Social values 05 h

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

Unit III Global Development on Ethics and Values 04 h

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

Unit IV Yoga and Meditation 05 h

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

Unit V Human Rights and Rights of Women and Children 05 h

Human Rights - Concept of Human Rights – Indian and International Perspectives - Evolution of Human Rights - Definitions under Indian and International

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

References

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

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part - I										
191TL1A3TA	Language - I	Tamil-III	4	-	-	3	25	75	100	3
191TL1A2HA		Hindi-III								
191TL1A2MA		Malayalam-III								
191TL1A2FA		French – III								
Part – II										
191EL1A3EA	Language - II	English – III	4	-	-	3	25	75	100	3
Part – III										
192PY1A3CA	CORE - V	Electricity and Electromagnetism	4	-	-	3	25	75	100	4
192PY1A3CP	Core Practical - III	Electricity and Magnetism	-	-	4	3	40	60	100	2
192CE1A3IA	IDC - III	Chemistry I	3	-	-	3	25	75	100	3
192CE1A3IP	IDC-Practical - I	Chemistry	-	-	4	3	40	60	100	2
192PY1A3SA	SEC - I	Electric Circuits and Networking Skills	3	-	-	3	25	75	100	3
	GE		2				-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A3AA	AECC - III	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A3AB		Advanced Tamil								
195CR1A3AA		Women's Rights								
		Total	**22**	**-**	**8**				**800**	**24**

EXTRA CREDIT COURSES

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

S. No.	Course Code	Course Name
1	192PY1ASSA	Electrical and Electronic Appliances
2	192PY1ASSB	Biophysics and Biomedical Instrumentation

ourse Code	Course Name	Category	L	T	P	Credit
191TL1A3TA	தமிழ்த் தாள்– III	மொழி-I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A3TA	பகுதி – 1 : தமிழ் தாள் : 3	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

1. காப்பியங்களின் தோற்றமும் வளர்ச்சியும்
2. சிலப்பதிகாரம் – மனையறம் படுத்த காதை
3. மணிமேகலை – வஞ்சிமாநகர் புக்க காதை

Unit II 10 h

1. கம்பராமாயணம் – கும்பகர்ணன் வதைப்படலம் (பா. எண் : 60 – 100)
2. பெரிய புராணம் – அதிபத்தநாயனார் புராணம்

Unit III 10 h

1.சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும்

2.தமிழ்விடு தூது – தூதுப்பொருள்கள் மட்டும் 101 முதல் 112 வரை(12 கண்ணிகள்)

3.திருக்குற்றாலக்குறவஞ்சி – வசந்தவல்லி பந்தாடிய சிறப்பு (6: 4கண்ணிகள்)

4.கலிங்கத்துப்பரணி – களம் பாடியது (போர்க்களக் காட்சி –பா.எண்: 472–502)

Unit IV 10 h

1. நாடகங்களின் தோற்றமும் வளர்ச்சியும்
2. நாடகம் - ஔவை–ஆசிரியர் இன்குலாப்

Unit V 08 h

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

3. பயிற்சிப்பகுதி

அ) அலுவலகம் சார்ந்த கடிதம்: விண்ணப்பங்கள், வேண்டுகோள், முறையீடு,

ஆ) வாசகர் கடிதம்: நாளிதழ், வானொலி, செய்தி ஊடகங்களுக்கு விமர்சனம் எழுதுதல்.

Text Books

1 மொழிப்பாடம் - 2020, தொகுப்பு : தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி.

2 இன்குலாப் – 2017. ஒளவை (நாடகம்), அன்னம் வெளியீடு, சென்னை.

References

1 புலவர் சோம. இளவரசு - 2014. இலக்கிய வரலாறு , மணிவாசகர் பதிப்பகம் , சென்னை – 108,

2 பேராசிரியர் முனைவர் பாக்யமேரி – முதற் பதிப்பு 2013 , இலக்கணம் இலக்கிய வரலாறு மொழித்திறன், பூவேந்தன் பதிப்பகம், சென்னை.

3 இணையதள முகவரி : www.tamilvirtual.com

Course Code	Course Name	Category	L	T	P	Credit
191TL1A3HA	HINDI-III	Language - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A3HA	HINDI-III	SEMESTER III

Total Credits: 03

Total Instruction Hours: 48 h

Syllabus

Unit I — 10 h

पद्य – काव्य पराशर (भोलानाथ)

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

प्रकाशक: जवाहर पुस्तकालय

सदर बाजार, मथुरा

उत्तर प्रदेश - 281001

Unit II — 10 h

हिन्दी साहित्य का इतिहास: (साधारण ज्ञान)

आचार्य रामचन्द्र शुक्ल

लोकभारती प्रकाशन इलाहाबाद

Unit III — 10 h

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

प्रकाशक: विनोद पुस्तक मंदिर

आगरा - 282002

Unit IV — 10 h

संवाद लेखन

पुस्तक: व्याकरण प्रदिप - रामदेव

प्रकाशक: हिन्दी भवन 36 इलाहाबाद - 211024

Unit V — 08 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में)

(पाठ 10 to 20)

प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17

Course Code	Course Name	Category	L	T	P	Credit
191TL1A3MA	MALAYALAM - III	Language - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A3MA	MALAYALAM - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

Kumaranasan

Unit II 10 h

Kumaranasan

Unit III 10 h

Kumaranasan

Unit IV 10 h

Kavyanchali Collection of Poems.

Unit V 08 h

Kavyanchali Collection of Poems.

Text Books

1 Chinthavishtayaya Sitha By Kumaranasan DC.Books Kottayam

2 Kavyanchali -Group of Authors DC.Books Kottayam

References

1 Kavitha Sahithya Charithram –Dr.M.Leelavathy Sahithya academy Thrissur.

Course Code	Course Name	Category	L	T	P	Credit
191TL1A3FA	FRENCH-III	Language - I	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents.	K1
CO2	To learn the adjectives and the classroom environment in France.	K2
CO3	Learn the Plural, Articles and the Hobbies.	K3
CO4	To learn the Cultural Activity in France.	K4
CO5	To learn 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	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A3FA	FRENCH-III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Excuses et vœux** 10 h

Compétence Culturelle : Convivialité - (lieux et société, - l'apéritif)

Compétence de Communication

- **INTERACTION ORALE:** Accueillir quelqu'un, s'excuser,remercier
- **RÉCEPTION ORALE**: Comprendre des announces enregistrées
- **RÉCEPTION ÉCRITE:** Compremdre une affiche
- **PRODUCTION ÉCRITE:** Écrire des cartes de vœux

Compétence Grammatical

Pronoms personnels toniques moi,je…;toi…tu - Pronoms personnels objets Me,te,le… - Lesverbsen-ercomme appeler,acheter - Lesadjectives possessives nos,vos,leurs

Unit II **Bravo et merci** 8 h

Communication et technologies (leportable, internet)

- **INTERACTION ORALE:** Interagir au téléphone , féliciter
- **RÉCEPTION ORALE:** Comperendre une emission à la radio
- **RÉCEPTION ORALE:** Comprendre une définition
- **PRODUCTION ECRITE:** Écrire des plaques commemoratives

Oui,que - Le passé composé - Le participe passé - J'ai eu,ella a été -

Longtemps,pendant …, de… à

Unit III **Faire et dire** 10 h

Jeunes : enquête

- **INTERACTION ORACE:** Demander de l'aide, donner des instructions
- **RÉCEPTION ORALE:** Comprendre un message enregistré
- **RÉCEPTION ÉCRITE :** Comprendre un article d'un magazine de consommateurs
- **PRODUCTION ÉCRITE :** Écrire un règlement

- du,de la (de l)',des,de

Unit IV **Faire ci ou faire ça** 10 h

- **INTERACTION ORALE :** Proposer quelque chose,accepter,refuser
- **RÉCEPTION ORALE :** Comprendre une émission de cuisine
- **RECEPTION ÉCRITE :** Comprendre une brochure d'informations
- **PRODUCTION ÉCRITE :** Ecrire un'texte de promotion touristique

S'il y a du soleil : L'hypothèse (supposition, Condition) la préposition S i + indicatif

Sinon… ou + indicatif - Sortir,partir - Quelques, plusieurs - Le long de - Au milieu de… - Au sommet de…

Unit V Dialogue writing 10 h

1. Au Restaurant
2. A la poste
3. A L' Aeroport
4. A La Gare
5. Chez Le Medecin

Text Books

1 Marcella Di Giura Jean-Claude Beacco, Alors II. Goyal Publishers Pvt Ltd 86, University Block ,Jawahar Nagar (Kamla Nagar), New Delhi – 110007

Course Code	Course Name	Category	L	T	P	Credit
191EL1A3EA	ENGLISH - III	Language II	4	0	0	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	Learn English grammar and its specific usage	K2
CO2	Know the methods of improving reading skills	K3
CO3	Understand the importance of speaking skills and developing it through various practices	K3
CO4	Comprehend the basic steps of reading and its necessity	K3
CO5	Acquire the writing skills and mandatory similar practices	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191EL1A3EA	ENGLISH - III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Basics of English 10 h

Phrasal verb - Notions and Conventional Idiomatic Expressions - One-Word Substitution - Word Formation - Homophones - Spelling - Sentence Completion – Sentence Pattern

Unit II Listening 08 h

Listening and Hearing - Principles of listening - Types of listening - incidental listening - active and effective listening - discriminative listening - critical listening - listening vs practice - Barrier to Listening - Guidelines for Improving Listening

Unit III Speaking 10 h

Monologues - Dialogue - Role Play - JAM (Just A Minute talk) - Debate - Public Speaking - Group Discussion - Interview - Showing Directions - Accent and Neutralization

Unit IV Reading 10 h

Mechanics of Reading - Types of Reading - Summarization - Paraphrasing - Analysis and Interpretation - Reading Comprehension – Reading with purpose and making predictions - Cloze Passage

Unit V Writing 10 h

Paraphrase Writing - Techniques and Methods of Paraphrasing - Precis Writing - Difference between Paraphrase and Precis - review writing - Hints Developing - Editorial Writing - Tabloid - Column Writing

Text Books

1. Bhatnagar R. P. 2013. English for Competitive Examinations. Macmillan Publishers, Chennai.
2. KoneruAruna. 2011. English Language Skills. McGraw Hill Education, Chennai.

References

1. Radhakrishna Pillai G. 2000. English for Success. Emerald Publishers, Chennai.
2. Gauri Mishra, Ranjana Kaul. 2016. Language Through Literature. Primus Books, New Delhi.
3. Miles Craven. 2008. Cambridge English Skills Real Listening and Speaking. First Edition, Cambridge University Press, India.
4. Teaching Adult: A Literary Resource Book. 2012. New Readers Press, New York, United States.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A3CA	ELECTRICITY AND ELECTROMAGNETISM	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic principles, theories and concepts of electricity and magnetism.
- The basic concept of thermoelectricity and electrical conductivity.
- The concept of Maxwell's Equation & Electromagnetic Waves.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Identify the magnetic flux through Biot-savart law and galvanometer.	K3
CO2	Relate the thermal and chemical effect of electric current.	K3
CO3	Explain the laws and concept of electromagnetic induction.	K2
CO4	Make use of the LCR in AC circuits.	K3
CO5	Examine the wave equations in electric and magnetic field.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A3CA	ELECTRICITY AND ELECTROMAGNETISM	SEMESTER III

Total Credits: 4
Total Instructions Hours: 48 h

Syllabus

Unit I Magnetic Effect of Electric Current 9 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 - Force on a current carrying conductor in a magnetic field - Torque on a current loop in a uniform 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 Alternating Current and Circuits 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 & Electromagnetic Waves 9 h

Basic laws - Maxwell's equations - Displacement current - Poynting vector - Maxwell's equations for electric and magnetic properties - Monochromatic plane waves in vacuum - Energy and momentum of electromagnetic wave - Reflection and Transmission at normal incidence.

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.
3. Brijlal & N. Subramanyam, 2005, Electricity and Magnetism, 6th edition, Agra,Ratan&Prakash
4. Satya Prakash, 2013, Electricity and Magnetism - 2nd Editions, Pragati Prakashan.
5. Ashutosh pramanik, 2012. Electromagnetism problems with solutions, 3rd Edition. PHI Learning Private Limited, Delhi.

192PY1A3CP	ELECTRICITY AND MAGNETISM	SEMESTER III

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	To determine the M and H -Deflection Magnetometer.
2	To find the magnetic field along the axis of a circular coil carrying current.
3	To find the moment of magnet – Tan C Position.
4	Comparison of mutual inductance - Ballistic galvanometer.
5	To determine a Low Resistance by Carey Foster's Bridge.
6	To characterize the Junction Diode.
7	To find the series resonance in series LCR circuit.
8	To study the Characteristics of a Series RC Circuit.
9	To characterize the transistor (CE).
10	To verify the Thevenin and Norton theorems.
11	Characteristics of a Zener diode.
12	To determine the angle and refractive index of prism – (i-d) Curve.

Note: Any 10 Experiments

References

1. Indu Prakash, Ramakrishna, 2011, A Text Book of Practical Physics, 11th Edition, , Kitab Mahal, New Delhi.
2. Geeta Sanon, R., 2009, B.Sc. Practical Physics, 2nd Edition, S.Chand & Co., New Delhi,
3. Panigrahi S., Mallick B., 2015, Engineering Practical Physics, Cengag Learning India Pvt. Ltd.
4. B. L. Flint and H. T. Worsnop, 2000, Advanced Practical Physics for students, Asia Publishing House.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A3IA	CHEMISTRY – I	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- About the electrochemical cell and its series.
- The types of chemical bonding and gaseous states of molecules
- The chemical kinetics of reaction, catalysis and the Solubility Product of 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 electrochemical cells and its series	K2
CO2	Explain the preparation an properties of simple polymers	K2
CO3	Infer the properties and types of alloys and batteries	K2
CO4	Relate the rate of the reaction and characteristics of catalytic reactions	K2
CO5	Examine the Solubility and ionic equilibria and concept of acid and bases	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong **M** Medium **L** Low

192CE1A3IA	CHEMISTRY – I	SEMESTER III

Total Credits: 3
Total Instruction Hours: 36 h

Syllabus

Unit I Electrochemistry 8 h

Types of conductance-electrolytic, specific, molar, equivalent - cell constant-variation of molar conductance with concentration - ionic mobility-transport number- Half reactions-oxidation and reduction, electrochemical cells-galvanic and electrolytic cells-reversible cells- types of reversible electrodes -single electrode potential - reference electrodes- EMF- cell representation –EMF and free energy - standard EMF-standard electrode potentials, electrochemical series, Nernst equation, applications.

Unit II Polymer Chemistry 7 h

Introduction – types of polymerization – Addition, condensation and copolymerization - plastics - classification of resins – Preparation, properties and uses of cellulose nitrate, cellulose acetate, PVC, PVA , PVAc and Nylon -6,6, PET, PAN. Conducting polymers-doping, types of doping, conductivity and its measurement.

Unit III Alloys & Batteries 7 h

Introduction – properties of alloys – significance of alloying – functions and effect of alloying elements – composition and properties - ferrous alloys – nichrome and stainless steel – brass – bronze. Batteries - Characteristics of battery - primary and secondary batteries - battery components and their role –description - chemical reaction and uses of batteries - alkaline – lead acid –nickel cadmium - lithium ion – fuel cell – H2-O2 fuel cell.

Unit IV Chemical Kinetics 7 h

Rate of reaction, rate law, order, molecularity, first order rate law, half life period of first order equation, pseudo first order reaction, zero and second order reactions. Derivation of rate expression for I and II order kinetics.

Catalysis – homogenous, heterogeneous and enzyme catalysis (definition only), enzymes used in industry, characteristics of catalytic reactions.

Unit V Solubility Product and Acids and Bases 7 h

Solubility and ionic equilibria, the solubility product, applications of solubility product. Acids – bases, Arrhenius, Bronsted- Lowry and Lewis concepts and relative strength of acids and bases, the pH scale, buffer scale, buffer action, Henderson equation, acid base indicators and theory of indicators.

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.
3. Bahl. A and Bahl. B.S, 2016, "A Textbook of Organic Chemistry", 22nd Edition, S. Chand & Company & New Delhi.

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. Glasstone. S and Lewis. D, 2014, "Elements of Physical Chemistry", 2nd Edition, Macmillan Ltd, London.

192CE1A3IP	IDC - CHEMISTRY PRACTICAL I	SEMESTER III

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Estimation of sodium hydroxide using sodium carbonate.
2	Estimation of Hydrochloric acid using standard Oxalic acid.
3	Estimation of Ferrous sulphate using standard Mohr salt solution.
4	Estimation of FAS using standard oxalic acid.
5	Estimation of KMnO4 using standard potassium dichromate.
6	Systematic analysis of Organic compounds containing diamides.
7	Systematic analysis of Organic compounds containing carbohydrate.
8	Systematic analysis of Organic compounds containing carboxylic acids (mono & di).
9	Systematic analysis of Organic compounds containing amines
10	Systematic analysis of Organic compounds containing amides.
11	Systematic analysis of Organic compounds containing aldehydes
12	Systematic analysis of Organic compounds containing ketones.

Note: Out of 12 – 10 Mandatory

References

1. Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017, "Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons & New Delhi.
2. Mendham. J, Denney. R.C, Bames. J.D and Thomas. M, 1989. "Vogel's Text book of Quantitative Analysis", 6th Edition, Pearson Education & UK.
3. Gopalan. R, Subramanian. P.S and Rengarajan. K, 2004, "Elements of Analytical Chemistry", 1st Edition, S. Chand and Sons & New Delhi.
4. Giri. S, Bajpai. D.N and Panday. O.P, 2013, "Practical Chemistry Vol. I & II", 30th Edition, S. Chand & Company & New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A3SA	ELECTRIC CIRCUITS AND NETWORKING SKILLS	SEC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The ideas behind electrical applications.
- The sills required to handle electrical appliances.
- The design and troubleshooting electrical circuits and their related networks.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Utilize the concepts of basic of electricity principles.	K3
CO2	Relate the series and parallel electrical circuits.	K3
CO3	Identify the power circuits and control circuits	K2
CO4	Label the primary and secondary cells.	K2
CO5	Interpret the network transformations.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A3SA	ELECTRIC CIRCUITS AND NETWORKING SKILLS	SEMESTER III

Total Credits: 3
Total Instructions Hours: 36 h

Syllabus

Unit I Basic Electricity Principles 6 h

Properties of the electrical circuit - Potential difference - Energy - Power - Kirchhoff's law - Current law and voltage law - Ohm's law - Power dissipation in resistance and resistances in combination.

Unit II Electrical Circuits 8 h

Series circuit - Characteristics of a series circuit - The case of zero IR drop – Polarity of IR drop - Proportional voltage formula in a series circuit - Opens and Shorts in a series circuit - Parallel circuits – Opens and shorts in a parallel circuit.

Unit III Passive Circuit Elements 7 h

Resistors – Types – Wire wound resistors – Carbon composition resistors - Potentiometer and rheostats - Resistor color code – Resistance color bands - Inductor – Air core inductor – Iron core inductor - Mutual inductance – Coefficient of coupling - Capacitance – Factors controlling capacitance.

Unit IV Energy Sources 7 h

Primary and secondary cells – Voltage and current of a cell – Carbon zinc cell – Alkaline cell - Manganese Alkaline cells – Nickel cadmium cell – Mercury cell – Photovoltaic cell – Solar cell.

Unit V Network Analysis 8 h

Network transformations – Thevenin Norton transformation – Star delta transformation - Nodal analysis – Miscellaneous theorems and techniques – Circuit reduction – Ladder networks – Ring mains.

Text Books

1 Smith K.A., Alley R.E, 2014, Electrical Circuits, , 3rd Edition, Cambridge University Press, London.

2 Theraja B.L., 2012, Basic Electronics, 2nd Edition, S Chand & Co, New Delhi.

References

1 Suresh kumar, K.S, 2008, Electric circuits and networks, 2nd Edition, Pearson publisher, Delhi.

2 Theraja B.L, 2012, A textbook in Electrical Technology, 2nd Edition, S Chand & Co, New Delhi.

3 Dilip, T, Dinesh, R, Pawar, N.M, 2011, Electrical circuits and network, 2nd Edition, S. Chand Publishing, New Delhi.

4 Despande M.V, 2011, Electrical Machines, 2nd Edition, PHI Learning, New Delhi

5 Fitzgerald A. E., David E Higginbothom, Arvin Gabrel, 2009, Basic Electrical Engineering, 3rd Edition, Tata McGraw-Hill Education, New Delhi.

192PY1A3GA	EVERYDAY PHYSICS –I	SEMESTER III

Total Credits: 2
Total Instructions Hours: 24 h

Syllabus

Unit I Basics of Fluids 4 h

Defining Fluid – Density of fluid - Pressure of fluid – Mercury Barometer - Archimedes' Principle - Buoyant Force – Floating of Ship in Water.

Unit II Temperature and Heat 5 h

Different Scales in Temperature: Kelvin Scale - Celsius Scale - Fahrenheit Scale – Heat Energy - Basic Heat Transfer Mechanism: Conduction - Convection - Radiation.

Unit III Sound Waves 5 h

Sound waves - Frequency of Wave - Wavelength of Wave- Amplitude of Wave- Speed of Sound - Doppler Effect - Detector Moving, Source Stationary - Source Moving, Detector Stationary - Supersonic Speeds - Shock Waves.

Unit IV Nuclear Physics 5 h

Basic Principles of Fission- Nuclear Fusion - Chain Reaction - Nuclear Fission Model - Nuclear Reactors in India

Unit V Solar Energy and Its Applications 5 h

Silicon Wafers - Solar Water Heater –Solar Cooking -Working of Hybrid Solar Cells – Working of Dye Sensitized Solar Cells.

Text Books

1. Halliday, Resnick, Walker, 2019. Fundamentals of Physics, 11th Edition. Wiley India Pvt.Ltd, New Delhi.
2. Rai G.D., 2004, Solar Energy Utilization, Khanna Publishers, New Delhi.

References

1 Brij Lal and Subrahmanyam, N, 1994, A Textbook of Optics, 4th Edition. S Chand and Co, New Delhi.

2 Sukhatme. S.P, 1997. Solar Energy, Principles of thermal collection and storage, 2nd Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

3 Brij Lal and N. Subrahmanyam, 2008. A Text Book of Sound, 2nd Edition. Vikas Publishing House, New Delhi.

4 Mathur, D.S. 2002. Heat and Thermodynamics. S Chand and Co, New Delhi.

5 Senthil Kumar G, 2013, Engineering Physics I & II, VRB Publications, Chennai.

191TL1A3AA	பகுதி – 4 : அடிப்படைத்தமிழ்தாள் : 1(Basic Tamil)	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24 h

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

அலகு : 1 தமிழ் மொழியின் அடிப்படைக் கூறுகள் 12 h

அ) எழுத்துகள் அறிமுகம் :

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

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

அலகு : 2 குறிப்பு எழுதுதல் 12 h

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

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 50

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி –ஆ

அரைப்பக்க அளவில் விடையளிக்க 03x5=15

பகுதி-இ

இரண்டு பக்க அளவில் விடையளிக்க 01x15=15

குறிப்பு:

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

Text Books

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

References

1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம்

2 வலைதள முகவரி : http://tamilvu.org

191TL1A3AB	பகுதி – 4 : சிறப்புத் தமிழ் தாள் : 1 **(Advanced Tamil)**	**SEMESTER - III**

Total Credits: 2

Total Instruction Hours: 24 h

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

அலகு – 1 மரபுக் கவிதைகள் 05 h

அ) பாரதியார் கவிதைகள்

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

ஆ) பாரதிதாசன் கவிதைகள்

- இன்பத்தமிழ்
- நீங்களே சொல்லுங்கள்
- வாளினை எடடா!

இ) தாராபாரதி கவிதைகள்

- வேலைகளல்ல வேள்விகள்

அலகு – 2 புதுக்கவிதைகள் 05 h

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

அலகு – 3 இலக்கணம் 04 h

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

அலகு – 4 கடிதங்கள் எழுதுதல் 05 h

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

அலகு – 5 பாடம் தழுவிய வரலாறு 05 h

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

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 50

பகுதி –அ	
சரியான விடையைத் தேர்வு செய்தல்	10x1=10
பகுதி –ஆ	
அரைப்பக்க அளவில் விடையளிக்க	05x3=15
பகுதி-இ	
இரண்டு பக்க அளவில் விடையளிக்க	05x5=25

குறிப்பு:

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

Text Books

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

References

1 புலவர் சோம. இளவரசு - 2014. இலக்கிய வரலாறு, மணிவாசகர் பதிப்பகம், சென்னை – 108

2 வலைதள முகவரி : http://tamilvu.org

195CR1A3AA	WOMEN'S RIGHTS	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24h

Syllabus

Unit I **Rights to Infant & Child** 4 h

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

Unit II **Rights to women** 5 h

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

Unit III **Laws for Senior Citizen women** 5 h

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

Unit IV **Civil and Political Rights of Women** 5 h

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

Unit V **International convention on Womens' Right** 5 h

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

Text Books

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

References

1 Women's Human Rights in India(2019)-Christian Foster and Jaya Sagade- Routledge India

2 Justice for Women: Concerns and Expressions (2008)-Anand AS –Universal Law Publishing Co.

192PY1ASSA	**SELF STUDY:** ELECTRICAL AND ELECTRONIC APPLIANCES	**SEMESTER III**

Total Credit: 1

Syllabus

Unit I Test and Measurement

Digital calipers – Digital screw gauge – Digital balance – Digital clock – Digital thermometer – Digital multimeters – Digital oscilloscopes.

Unit II Home appliances

Air conditioner – Refrigerator – Microwave oven – Induction cooker – Washing machines – Inverters – Solar powered appliances – Digital cameras.

Unit III Communication

Fibre optics – Cellular phones – Cellular phone jammers – Bluetooth – WiFi – LiFi -- Global positioning system – RFID security systems.

Unit IV Robotics

Basics – Robotic arm – Mobile robots – Autonomous robots - Honda's ASIMO robot.

Unit V Computers

Basic components – Motherboards – Memory – I/O devices – Assembling – Operating systems.

Text Books

1 Alok Kumar, 1st Edition, 2008. Computer General Awareness. UpkarPrakashan.

2 S K Saha, 1st Edition, 2008. Introduction to Robotics. Tata McGraw-Hill Education.

References

1 GottapuSasibhushana Rao, 1st Edition, 2012. Mobile Cellular Communication. Pearson.

192PY1ASSB	**SELF STUDY:** BIOPHYSICS AND BIOMEDICAL INSTRUMENTATION	**SEMESTER III**

Total Credit: 1

Syllabus

Unit I Fundamentals of Biophysics

Atom – Atomic structure – Chemical bonds: ionic bonds, covalent bonds, formation of covalent bonds, weaker interaction – Fundamental concepts: light, sound, pressure, heat content of food, blood pressure, pH – Determination of pH – Buffer solution – Determination of pH by indicators –Nucleic acids: DNA, RNA.

Unit II Biophysical properties

Surface tension – Diffusion: definition, factors affecting diffusion, biological signification of diffusion – Osmosis: definition, factors affecting osmosis, biological signification of osmosis – Adsorption: definition, factors affecting diffusion, biological signification of diffusion – Colloids: definition – Characteristics of colloids: kinetic properties, optical properties, electrical properties, stability of colloids – Biological importance of colloids – Dialysis: principle of dialysis – Kinds of dialysis.

Unit III Fundamentals of Biomedical Instrumentation

Sources of Biomedical signals – Basic medical instrumentation system – Intelligent medical instrumentation systems: Microprocessor based medical instruments – PC based medical instruments – Biomedical recorders: Basic electronic recording system, Electrocardiograph (ECG), Block diagram of ECG, Electroencephalograph (EEG), Block diagram of EEG.

Unit IV Fundamentals of Biomedical imaging systems

X-ray Imaging system: Nature of X-rays, X-ray machine – Computed Tomography (CT scan): Principle, Components of CT scan system – Magnetic Resonance Imaging (MRI) system: Principle, basic NMR components, block diagram of the NMR detection system, biological effects of NMR imaging, advantages of NMR imaging system – Ultrasonic Imaging systems: Medical ultra sound, echocardiograph, digital scan converter, biological effects of ultra sound.

Unit V Radiotherapy and Lasers

Radiotherapy: Radioactive decay – Alpha, beta and gamma - Isotopes – Medical linear accelerator machine – Radiation detectors – GM counter, Ionization chamber. Laser: Principle – Types of lasers: Ruby laser, Helium-neon laser, semiconductor er – Laser safety – Uses of laser in medical field.

Text Books

1 Subramanian, M.A, 2006. Biophysics: Principles and Techniques. MJP Publishers, Chennai.

2 Palanichamy, S. and Shanmugavelu, M, Principles of Biophysics. Palani Paramount Publications, Palani.

References

1 R.S.Khandpur, 2014. Handbook of Biomedical instrumentation, TMH Publication Ltd.

2 Murugesan, R, 11th Edition. 2003. Modern Physics, S Chand & Company Ltd, New Delhi..

3 Pattabhi, V. and Gowtham, 2nd Edition. 2011. Biophysics. Narosa Publishing House, New Delhi.

4 Daniel, M. 1998. Basic Biophysics for Biologist. Agro-bios, Jodhpur. .

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
Part - I										
191TL1A4TA	Language – I	Tamil - IV	4	-	-	3	25	75	100	3
191TL1A4HA		Hindi - IV								
191TL1A4MA		Malayalam - IV								
191TL1A4FA		French – IV								
Part – II										
191EL1A4EA	Language – II	English – IV	4	-	-	3	25	75	100	3
Part – III										
192PY1A4CA	Core - VI	Optics and Spectroscopy	4	-	-	3	25	75	100	4
192PY1A4CP	Core Practical - IV	Optics and Spectroscopy	-	-	4	3	40	60	100	2
192CE1A4IA	IDC – IV	Chemistry - II	3	-	-	3	25	75	100	3
192CE1A4IP	IDC Practical – II	Chemistry	-	-	4	3	40	60	100	2
192PY1A4SA	SEC – II	Basic Instrumentation Skills	3	-	-	3	25	75	100	3
	GE - II		2	-	-	3	-	50	50	2
	LoP	Lab on Project	-	-	-	-	-	-	-	-
Part - IV										
191TL1A4AA	AECC - IV	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A4AB		Advanced Tamil								
192PY1A4AA		General Awareness								
		Total	**22**	**-**	**8**	**-**	**-**	**-**	**800**	**24**

Course Code	Course Name	Category	L	T	P	Credit
191TL1A4TA	பகுதி-1: தமிழ் - தாள்- IV	மொழி	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A4TA	பகுதி-1: தமிழ் - தாள்- IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **எட்டுத்தொகை** 10 h

1. இலக்கிய வரலாறு - எட்டுத்தொகை நூல்கள்
2. 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 :9 – பெருங்கடுங்கோ

2. அகநானூறு – மருதத்திணை

I.பா.எண் : 86 – நல்லாவூர்கிழார்

குறிஞ்சித் திணை

I.பா.எண் :198 – பரணர்

2. 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. இலக்கிய வரலாறு - பத்துப்பாட்டு நூல்கள்
2. பட்டினப் பாலை – கடியலூர் உருத்திரங் கண்ணனார்

Unit IV **புதினம்** 10 h

1. புதினத்தின் தோற்றமும் வளர்ச்சியும்
2. புதினம்

1.புத்துமண் –- சுப்ரபாரதிமணியன்

Unit V **இலக்கணம் மற்றும் திறனாய்வுப் பகுதி** 10 h

I.இலக்கணம்

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

II.பயிற்சிப் பகுதி

புதினத் திறனாய்வு – கொங்கு வட்டாரப் புதினங்கள்

1. நாகம்மாள் – ஆர். சண்முகசுந்தரம்
2. மானாவாரி மனிதர்கள் – சூர்யகாந்தன்
3. ஈரம் கசிந்த நிலம் – சி. ஆர். ரவீந்திரன்
4. ஒண்டிக்காரன் பண்ணையம் – மா. நடராசன்

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

Text Books

செய்யுள் திரட்டு - மொழிப் பாடம் - 2020- 21

1 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, வெளியீடு : நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 600 098.

2 சுப்ரபாரதிமணியன், முதற் பதிப்பு -2019, புத்துமண் புதினம் – நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 600 098. (Unit-IV)

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 தமிழ் இணையக் கல்விக்கழகம்.http://www.tamilvu.org/

Course Code	Course Name	Category	L	T	P	Credit
191TL1A4HA	Part- I : HINDI - Paper-IV	Language	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A4HA	Part- I : HINDI - Paper-IV	SEMESTER IV

Total Credits: 03

Total Instruction Hours: 48 h

Syllabus

Unit I — 10 h

नाटक – लडाई – सर्वेश्वरदयाल सक्सेना

प्रकाशक: वाणी प्रकाशन

21-A, दरियागंज

नई दिल्ली-110002

Unit II — 10 h

एकांकी: एकांकी पंचामृत – डॉ राम कुमार

(भोर और तारा छोड़कर)

प्रकाशक: जवाहर पुस्तकालय

सदर बाजार, मथुरा

उत्तर प्रदेश-281001

Unit III — 10 h

काव्य मंजरी- (डा मुन्ना तिवारी)

मैथिलीशरण गुप्त- मनुष्यता, जयशंकर प्रसाद- बीती विभावरी जागरी

सूर्यकान्त त्रिपाठी निराला- तोडती पत्थर और भिक्षुक

Unit IV — 10 h

सूचना लेखन

पुस्तक: व्याकरण प्रदिप – रामदेव

प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024

Unit V — 08 h

अनुवाद अभ्यास-III (केवल अंग्रेजी से हिन्दी में)

(पाठ 10 to 20)

प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17

Course Code	Course Name	Category	L	T	P	Credit
191TL1A4MA	Part- I : MALAYALAM - Paper-IV	Language	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A4MA	Part- I : MALAYALAM - Paper-IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

Drama

Unit II 10 h

Drama

Unit III 10 h

Drama

Unit IV 10 h

Screen Play

Unit V 08 h

Screen Play

Text Books

1. Manju Poloru Penkutty, Screen Play By Kalavoor Ravikumar, Published by DC.Books, Kannur.
2. Lankalakshmi, Drama By C.N.Sreekandan Nair Published by D C.Books Kottayam

Course Code	Course Name	Category	L	T	P	Credit
191TL1A4FA	Part- I : **FRENCH-** Paper-IV	**Language**	**3**	**1**	**-**	**3**

PREAMBLE

This course has been designed for students to learn and understand

- To Acquire Competence in General Communication Skills – Oral + Written – Comprehension & Expression.
- To Introduce the Culture, life style and the civilization aspects of the French people as well as of France.

  To help the students to acquire Competency in translating simple French sentences into English and vice versa.

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191TL1A4FA	Part- I : FRENCH- Paper-IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Cœur et santé** 10 h

• Author du Couple	• INTERACTION ORALE: Exprimer son intérêt pour quelqu'un, exprimer l'affection • RECEPTION ORALE: Comprendre une chanson • RECEPTION ÉCRITE: Lire un horoscope • PRODUCTION ÉCRITE: Écrire une letter au courrier du cœur	• J'étais…L'imparfait(1) • Aussi brilliant que… • Le plus beau, le moins cher • Le verbe connaître

Unit II **Problémes problems** 10 h

• Le bénvolat	• INTERACTION ORALE: Interroger sur la tristesse, I'abattement, exprimer sa sympathie, rassurer • RÉCEPTION ORALE: Comprendre une interview à la radio • RECEPTION ÉCRITE: Comprendre un test de magazine • PRODUCTION ÉCRITE: Écrire une letter a un(e) amie	• Les pronoms indfinis rien, quelque chose • Le verbe crier • Du pluriel: eau, eu, al • Se soigner, s'excuser, se renseigner, s'appeler • La phrase ngative: ne… plus, ne… jamais, ne… rien, ne… personne

Unit III C'est qui? C'est comment? 10 h

• Les classes socials	INTERACTION ORALE: Décrire quelqu'un RECEPTION ORALE: Comprendre un bulletin météo RECEPTION ÉCRITE: Comprendre une courte interview PRODUCTION ÉCRITE: Écrire des notices biographiques	• Les adjectifs qualificatifs: Formes au masculin et au féminin • ll fait beau, il neige, il pleut… • Le verbe décrier • Les verbs en –indre • Les adjectifs possessifs féminins mon, ton, son devant voyelle ou h

Unit IV Et après? Et après 10 h

• La mémoire et l'histoire	• INTERACTION ORALE: Raconter une anecdote, une histoire, attire l'attention • RÉCEPTION ORALE: Comprendre une interview à la radio • RÉCEPTION ÉCRITE: Comprendre des faits divers • PRODUCTION ÉCRITE: Écrire une bréve	• L'imparfait(2) • Les verbs en – oir • Les pronoms démonstratifs ça et cela • Prés de… Loin de… • La forme passive

Unit V Dialogue writing 08 h

a) Les Courses
b) A La Banque
c) Ecole
d) Professions
e) Bijoux

Text Books

1. *Marcella Di Giura Jean-Claude Beacco,* **Alors II. Pages 88 – 162,** Goyal Publishers Pvt Ltd 86, University Block ,Jawahar Nagar (Kamla Nagar), New Delhi – 110007.
2. *French Made Easy by Rashmi Varma, Goodwill Publishing House, New Delhi* – 110 008.

Course Code	Course Name	Category	L	T	P	Credit
191EL1A4EA	ENGLISH- IV	LANGUAGE	4	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The basics of English grammar and specific usages
- 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	Learn English grammar and its specific usage	K2
CO2	Know the ways of improving English language vocabulary	K3
CO3	Understand the importance of English language in competitive exams	K3
CO4	Acquire the basic needs of communication skills and methods	K3
CO5	Comprehend the composition writing and similar skills	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

191EL1A4EA	ENGLISH- IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Grammar 10 h

The use of correlatives - The perfect tense - appended questions - the infinitive - negative verbs - redundant conjunctions - use of make and do - fairly and rather

Unit II Vocabulary 10 h

Words and contextual uses - Synonyms - Antonyms - Add one out - inflectional - infix- telescoping - loanwords - British and American words - Thesaurus

Unit III Language Use 08 h

Spotting Errors - Words often confused - Reconstructing a Passage - Clause - Idioms and colloquialism - Language aptitude - Clipping

Unit IV Communication 11 h

Different Types of Asking - Oral rehearsal - Describing person, Diagram, Data, Table - Vote of thanks - Small talk - Refusal and Apology

Unit V Composition 09 h

General Essay writing - Mind map - Reviews - Title expansion - Creative writing - Content writing - Translation - Abstracting - Flash Fiction

Text Books

1. Wood F.T. 2010. A Remedial Grammar for Foreign Students. Macmillan Publishers, India. [Unit I and II]
2. Bhatnagar R.P. 2013. English for Competitive Examinations. 3rd Edition. Trinity Press, New Delhi. [Unit III, IV and V]

References

1. Radhakrishna Pillai G. 2000. English for Success. Emerald Publishers, Chennai.
2. Krishnaswamy N. 2000. Modern English a Book of Grammar Usage and Composition. Macmillan Publishers, India.
3. Arulselvi Evangelin. 2012. Teaching of Special English. Saratha Pathippagam, Chennai.
4. Rawdon Wyatt. 2008. Check Your Vocabulary for TOFEL. Macmillan Publishers, India.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A4CA	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	Classify the different types of aberrations and Demonstrate the dispersive power of prism through experiments in laboratories	K2
CO2	Interpret the interference pattern form and refractometer	K2
CO3	Experiment with the Fresnel and Fraunhofer diffraction and identify the dispersive power of grating through laboratory experiments	K3
CO4	Identify the plane, circularly and elliptically polarized light and compare different types of microscopes	K3
CO5	Make use of the principle of spectroscopy for their applications	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A4CA	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 distances - Dispersion by a prism - Angular dispersion and dispersive power - Combination of prisms to produce dispersion without deviation, deviation without dispersion.

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 - Jamin's Refractometer – Rayleigh's Refractometer.

Unit III Diffraction 9 h

Fresnel's assumptions - Rectilinear propagation of light - Half period zone - Zone Plates - Cornu`s spiral - 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, circular and elliptical polarized light - Quarter wave plate and half wave plate - Application of polarized light - Optical activity - Optical rotation - Fresnel's explanation - Specific rotation - Laurent's half shade polarimeter.

Optical Instruments: Huygens and Ramsden eyepieces, Electron microscope, SEM and TEM

Unit V Spectroscopy 10 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 - Quartz Spectrograph for near UV region - Double beam Infrared spectrometer - Nuclear magnetic resonance.

Text Books

1. Brij Lal and Subrahmanyam N, 2014, "A Text Book 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. Aruldhass G, 2017, "Molecular Structure and Spectroscopy", PHI Pvt Ltd, 2nd Edition, New Delhi
4. E book - Ajoy Ghatak, 2015, "Optics", 5th Edition, McGraw Hill Education Pvt Ltd, New Delhi

192PY1A4CP	CORE PRACTICAL: OPTICS AND SPECTROSCOPY	SEMESTER IV

Total Credits: 4
Total Instructions Hours: 48 h

S.No	List of Experiments
1	Determination of the wavelength of sodium light and the number of line per centimeter using diffraction grating.
2	Determination of dispersive power and resolving power using plane diffraction grating.
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	Determination of the resolving power of a telescope.
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	Verification of Truth tables of IC gates through De Morgan's theorem.
11	Determination of the Refractive Index of water using hollow prism.
12	Find the focal length of a convex lens by plotting graphs between u and v or between 1/u and 1/v.
13	Determination of the wavelength of sodium light using Newton's Rings.

Note: Any 10 Experiments

References

1. Chattopadhyay.D, 2015, "Advanced Course in Practical Physics", 8th Edition, NCBA Publishers, Kolkata.
2. Samir Kumarghosh, 2013, "Textbook of Advanced Practical Physics", NCBA Publishers.
3. Arora. C.L., 2013, "B.Sc. Practical Physics", 19th Edition, S.Chand and Company Limited, New Delhi.
4. Ouseph C.C, 2014, "Practical Physics and Electronics", S.Chand and Company Limited, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192CE1A4IA	CHEMISTRY II	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The basic knowledge about coordination, nuclear and surface chemistry.
- The classification and preparation of nano materials.
- About the rubbers and inorganic polymers.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the knowledge of coordination compounds and its biological importance.	K2
CO2	Extend the classification and synthesis of nanomaterials.	K2
CO3	Infer the importance of nuclear chemistry and radioactive materials.	K2
CO4	Apply the action of colloids in daily life.	K3
CO5	Show the composition of different type of rubbers and characteristics of inorganic polymers.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192CE1A4IA	CHEMISTRY II	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Coordination Chemistry 8 h

Classification of ligands - Nomenclature of coordination compounds – Werner's Coordination theory – Sidgwick's concept of Effective Atomic Number. Valence bond theory – Formation of Octahedral complexes on the basis of VBT - Limitations of VBT. Applications of coordination complexes, Biological role of heamoglobin and ChrophyII.

Unit II Nano Materials 7 h

Introduction to Nanomaterials – classification (1D, 2D and 3D) with examples - Synthesis - top down and bottom up approach - coprecipitation - solgel - chemical reduction - photochemical reduction – hydrothermal and solvothermal synthesis. Carbon nanotubes – types, properties and uses.

Unit III Nuclear Chemistry 7 h

Introduction, nuclear stability, n/p ratio, magic numbers, packing fraction, mass defect and binding energies. Isotopes, isobars and isotones. Detection of isotopes - autoradiography.

Radioactivity – emission of alpha, beta and gamma rays. Radioactive disintegration - half-life period - C14 dating - uses of C14 dating. Applications of radioactive isotopes.

Unit IV Colloidal Chemistry 7 h

Colloids - types, preparation, purification, properties (kinetic, optical and electrical) and applications. Stability of colloids, gold number, cleansing action of soaps and detergents. Emulsion – types, preparation, properties and application. Gels – types, preparation, properties and applications.

Unit V Rubber & Inorganic Polymers 7 h

Rubber - Natural and synthetic rubbers - neoprene rubber and styrene butadiene rubber.

Inorganic polymers: Synthesis, properties and uses of silicones, Polyphosphazenes, silaxanes. Classification and structure of silicates.

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. Malik W. U. Tuli G. D. and Madan R.D, 2012, "Selected topics in Inorganic Chemistry", S. Chand & Co. Ltd., New Delhi.
3. Lee J. D. 2014, "A New Concise Inorganic Chemistry", 5th Edition, Oxford Publishers, UK,

References

1. Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th Edition, McGraw Hill Company, USA
2. Soni, P.L. 2000, "Text book of Inorganic Chemistry", 20th Edition, S. Chand & Co. Ltd., New Delhi.
3. Bahl. A and Bahl. B.S, 2015, "Advanced Organic Chemistry", Revised multicolor Edition, S. Chand and Co., New Delhi.
4. Sharma B.K, 2001, "Industrial Chemistry", 6th Revised Edition, Krishna Prakasam Media (P) Ltd, Meerut.

192CE1A4IP	IDC PRACTICAL II: CHEMISTRY	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 48h

S.No	List of Experiments
	I Electrical Experiments
1	Determination of cell constant, specific conductivity and equivalent conductivity of strong electrolyte.
2	Determination of strength of unknown using conductometric titration. (strong acid vs strong base).
3	Determination of strength of unknown using conductometric titration. (Mixture of acid vs strong base).
4	Determination of strength of unknown using conductometric titration. (weak acid vs strong base).
5	Determination of strength of unknown using potentiometric titration. (Strong acid vs strong base).
6	Estimation of iron content of the given solution using potentiometer
7	Conductometric precipitation titration using BaCl2 and Na2SO4
8	Determination of strength of given hydrochloric acid using pH meter.
	II Estimations
9	Estimation of total, temporary & permanent hardness of water by EDTA method
10	Estimation of alkalinity in water sample
11	Estimation of DO content of water sample by Winkler‟s method.
12	Estimation of chloride content of water sample by argentometric method

Note: Out of 12 – 10 Mandatory

References

1. Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R, 2017, "Principles of Practical Chemistry", 1st Edition, Sultan Chand & Sons, New Delhi
2. Gnanapragasam. N. S, Ramamurthy. G. 1998, "Organic Chemistry lab manual", S. Viswanathan and Co. Pvt. Ltd., Chennai.
3. Gopalan. R, Subramanian. P.S and Rengarajan. K, 2004, "Elements of Analytical Chemistry", 1st Edition, S. Chand and Sons, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A4SA	BASIC INSTRUMENTATION SKILLS	SEC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The principles and concepts of various measuring instruments.
- The various aspects of instruments and their usage.
- The basis formation of circuit theory concepts, electrical machines, electrical measurements.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Infer the functions of measurement instrument like multimeters and voltmeters.	K2
CO2	Apply the fundamental of CRO voltmeter to its applications	K3
CO3	Explain the classification & characterization of signal generators.	K2
CO4	Illustrate the technical problems associated with various forms of bridges and their measurements.	K2
CO5	Make use digital voltmeter & multimeter.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A4SA	BASIC INSTRUMENTATION SKILLS	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Basic of Measurement 8 h

Measurement - Significance of measurements - Applications of measurement systems - Factors relating to selection of instruments - Functions of measurements - Accuracy, sensitivity, precision, noise - Voltmeter - Types and advantages - Electronic multimeter - Working, Advantages and disadvantages.

Unit II Cathode Ray Oscilloscope 7 h

Block diagram of basic CRO - Working of CRO - Applications of CRO - Cathode ray tube - Electron gun assembly, Deflection plates assembly, Fluorescent screen, Glass envelope, Base - Differences between CRT & Television picture tube.

Unit III Signal and pulse Generators 7 h

Signal generator - Characteristics & Classification of signal generator - Modern signal generator - Comparison between standard and modern signal generators - Block diagram, circuits used in pulse generator - Other signal generators - Applications.

Unit IV Impedance Bridge 7 h

Various forms of bridge - Advantages of bridge circuits - Precautions when using a bridge - Impedance (or R-L-C) bridge - Measurements of resistance, inductance & capacitance - Circuit diagram, working of a Q- Meter.

Unit V Digital Instruments 7 h

Building block of a digital instrument - Characteristics, advantages & applications of digital meter - Comparison of analog & digital instruments - Digital Voltmeter (DVM) - Characteristics, advantages & applications of DVM - Digital multimeter (DMM) - Block diagram, working of DMM - Comparison between analog & digital multimeter.

Text Books

1. Rajput. R K, 2012, "Electronic Measurements & Instrumentation", S Chand, and Co, New Delhi.
2. Salivahanan. S & Kumar. N. S, 2012, "Electronic Devices and Circuits", 3rd Edition,Tata Mc-Graw Hill, New Delhi.

References

1. Theraja. B L, 2014, "Basic Electronics", S. Chand & Co, New Delhi..
2. Mehta. V K, 2012, "Principles of Electronics", S Chand & Co, New Delhi.
3. Santanuchattopadhyay, 2014, "Textbook of Electronics", NCBA.
4. Jacob Millman, 2016, "Integrated Electronics: Analog and Digital Circuits and Systems", Tata Mc-Graw Hill, New Delhi.

192PY1A4GA	EVERYDAY PHYSICS II	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 24H

Syllabus

Unit I Gravitation Field 5h

Newton's law of gravitation – Universal gravitational constant – Acceleration due to gravity – Variation of 'g' with altitude – Inertial mass – Gravitational mass – Orbital velocity – Time period of a satellite – Uses of satellites.

Unit II Properties of Matter 5h

Elasticity – Stress – Strain – Elastic limit – Hooke's law – Experimental verification of Hooke's law - Three moduli of elasticity – Pascal's law – Applications – Viscosity – Coefficient of Viscosity – Streamline flow and turbulent flow - Applications.

Unit III Electricity and Magnetism 5h

Electric Current – Current density – Ohm's law – Electrical resistivity and conductivity – Resistance – Specific resistance – Kirchoff's law – Faraday's laws – Verification of Faraday's laws – Basic properties of magnets – Magnetic moment – Magnetic Field – Magnetic induction.

Unit IV Modern Physics 4h

Nucleus – Nuclear Structure – Mass number – Atomic number – Nuclear mass – Binding energy – X-rays – Properties of X- rays and its applications – Radioactivity – Properties of alpha, beta and gamma rays – Half life period- Applications.

Unit V Electronics and Digital Electronics 5h

Intrinsic and Extrinsic semiconductors – P and N type – PN junction diode – Characteristics – Binary numbers – Conversion of binary-to-decimal and decimal to-Binary – Logic gates – AND, OR and NOT gates.

Text Books

1 Murugesan.R, 2013, "Properties of Matter and Sound", S Chand and Co, New Delhi.

2 Murugesan.R, 2014, "Electricity and Magnetism", S Chand and Co, New Delhi.

References

1 Murugesan, R. 2014, "Modern Physics", 11th Edition, S. Chand and Co, New Delhi.

2 Donald. P and Leach, 2016, "Digital Principles and Applications", Tata McGraw Hill, New Delhi.

3 Resnick and Halliday, 2015, "Principles of Physics", 9th Edition, Wiley Publications.

4 Metha, V.K. and Mehta R, 2014, "Principles of Electronics", 11th Edition, S Chand and Co, New Delhi.

5 Marikani.A, 2014, "Engineering Physics", 5th Edition, PHI Publishing Company Pvt. Ltd.

191TL1A4AA	பகுதி – 4 : அடிப்படைத்தமிழ் - தாள் : II (Basic Tamil)	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019–20ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது

(10 மற்றும் 12 – ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு)

(பருவத் தேர்வு உண்டு)

அலகு : 1 12 h

நீதி நூல்கள்

I.ஆத்திசூடி - "அறம் செய விரும்பு" முதல் "ஔவியம் பேசேல்"வரை -12 பாடல்கள்

II.கொன்றைவேந்தன் - "அன்னையும் பிதாவும் முன்னறி தெய்வம்" முதல்

"எண்ணும் எழுத்தும் கண் எனத் தகும்" வரை -7 பாடல்கள்

III.திருக்குறள் - 6 பாடல்கள்

1. அகர முதல 1
2. மனத்துக் கண்.....34
3. இனிய உளவாக 100
4. தீயவை தீய பயத்தலான்.....202
5. கற்க கசடற 391
6. கண்ணொடு கண்ணினை.....1100

அலகு : 2 12 h

I. எளிய நீதிக்கதைகளும் வாழ்க்கை முறைகளும்

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

II. தமிழகப் பண்பாடுகள்

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

III . பயிற்சிப் பகுதி

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

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி – அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி – ஆ

சரியா? தவறா? தேர்ந்தெடுத்து எழுதுக . 10x2=20

பகுதி - இ

ஒரு பக்க அளவில் விடையளிக்க 03x20=60

குறிப்பு:

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

Text Books

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

References

1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம்

2 வலைதள முகவரி : http://tamilvu.org

191TL1A4AB	பகுதி – 4 : சிறப்புத்தமிழ் - தாள் : II (Advanced Tamil)	SEMESTER - IV

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019– 2020 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது

(10 மற்றும் 12 – ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது

(பருவத் தேர்வு உண்டு)

அலகு – 1 05 h

திருக்குறள்

I அறத்துப்பால்

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

II பொருட்பால்

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

III இன்பத்துப்பால்

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

அலகு – 2 05 h

கட்டுரைத் தொகுப்பு

I நல்வாழ்வு - டாக்டர் மு.வரதராசன்

1. நம்பிக்கை
2. புலனடக்கம்
3. பண்பாடு

II இளைஞர்களின் ஒளிமயமான எதிர்காலத்திற்கு - கு.வெ. பாலசுப்பிரமணியம்

1. காலக்கணக்கு
2. நற்பழக்கமே செல்வம்

அலகு – 3 05 h

I காப்பியங்கள் - குறிப்பு எழுதுதல்

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

II ஊடகம் - காட்சி ஊடகங்கள்

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

அலகு – 4 05 h

இலக்கணம் - வழக்கறிதல்

1. இயல்பு வழக்கு
2. தகுதி வழக்கு

அலகு – 5 04 h

I படைப்பாற்றல் பகுதி

கவிதை,கட்டுரை எழுதச்செய்தல் - பொதுத் தலைப்பு

II பயிற்சிப் பகுதி

தமிழில் தட்டச்சு செய்தல் - யூனிகோடு எழுத்துருவில்.

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி –ஆ

கோடிட்ட இடங்களை நிரப்புக 10x2=20

பகுதி –இ

இரண்டு பக்க அளவில் விடையளிக்க 4x15=60

குறிப்பு :

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

Text Books

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

References

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

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

3 வலைதள முகவரி : http://tamilvu.org

192PY1A4AA	AECC : GENERAL AWARENESS	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 24 h

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

References

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

Fifth Semester										
Part – III										
192PY1A5CA	Core	Mathematical methods	4	1	-	3	25	75	100	4
192PY1A5CB	Core	Classical and Statistical methods	4	-	-	3	25	75	100	4
192PY1A5CC	Core	Solid State Physics	4	-	-	3	25	75	100	4
192PY1A5CP	Core Practical	Solid State physics	-	-	4	3	40	60	100	2
192PY1A5CQ	Core Practical	Programming in C	-	-	4	3	40	60	100	2
192PY1A5SA	SEC	Principles of Programming Concepts and C Programming	3	-	-	3	25	75	100	3
192PY1A5DA/ 192PY1A5DB/ 192PY1A5DC	DSE	Geo Physics/ Astro Physics/ Medical Physics	4	-	-		25	75	100	4
192PY1A5TA	IT	Industrial Training	**Grade A to C**							
192PY1A5LA	LoP	Lab on Project	-	-	-	-	50	-	50	1
Part – IV										
192MT1A5AA	AECC	Research Methodology	2	-	-	3	-	-	50	2
		Total	**21**	**1**	**8**				**800**	**26**

Course Code	Course Name	Category	L	T	P	Credit
192PY1A5CA	MATHEMATICAL METHODS	CORE	4	1	-	4

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	Identify the concept of vector analysis.	K3
CO2	Outline the determinants and matrix.	K2
CO3	Integrating the integral calculus and co-ordinates.	K3
CO4	Implementing the special functions.	K3
CO5	Understand basic principle of Fourier series and their applications.	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A5CA	MATHEMATICAL METHODS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Vector Analysis 12 h

Representation of vectors- Vector space- Conditions for a physical quantity to be representable by vector - Simple applications of vectors to mechanics - Vector differential of a scalar field and the gradient - Conservative vector field - The vector differential operator - The divergence of a vector - The operator- The Laplacian - The curl of a vector.

Unit II Matrices 12 h

Basic ideas of matrices – Addition, subtraction, scalar multiplication, Transpose of a matrix, conjugate of a matrix, diagonal matrix - Representation of vectors as column matrix – Determinants – Cramer's rule – Eigen Values and Eigen Vectors – Hermitian matrix, unitary matrix.

Unit III 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 (Basic ideas).

Unit IV 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.

Unit V Fourier Series 12 h

Periodic functions - Orthogonality of sine and cosine functions - Dirichlet Conditions (Statement only) - Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients - Even and odd functions and their Fourier expansions - Summing of Infinite Series - Term-by-Term differentiation and integration of Fourier Series - Parseval Identity.

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 BS, 2017, "Mathematical Physics",23rd Edition, Pragati Prakashan, New Delhi.

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

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

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

Course Code	Course Name	Category	L	T	P	Credit
192PY1A5CB	CLASSICAL AND STATISTICAL METHODS	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 Hamiltonianformulations 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.	K3
CO3	Construct Hamiltonian functions and canonical transformations.	K3
CO4	Explain the classical Maxwell's Boltzmann statistics.	K2
CO5	Analyze Bose-Einstein and Fermi Dirac quantum statistics.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A5CB	CLASSICAL AND STATISTICAL METHODS	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.

External and internal forces -Centre of mass - Conservation of linear momentum - Centre of mass - Frame of reference - Conservation of angular momentum - Conservation energy- Kinetic energy - Potential energy.

Unit II Lagrangian Formulation 9 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 10 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 – Generating functions – Advantages and examples of Canonical transformations.

Unit IV Classical Statistics 9 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 10 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 law - Electron gas in metals- Fermi Dirac gas.

Text Books

1 Gupta, Kumar, Sharma, 2005,"Classical Mechanics", 3rdEdition, PragatiPrakashan Publishers & Meerut

2 Sathyaprakash, "Statistical Mechanics", KedarNath and Ram Nath, Meerut& New Delhi (e-book)

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

Course Code	Course Name	Category	L	T	P	Credit
192PY1A5CC	SOLID STATE PHYSICS	CORE	4	-	-	4

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.	K3
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 magnetization.	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	S	S	S	M	M
CO2	S	S	M	M	S
CO3	S	S	S	M	S
CO4	S	S	S	M	M
CO5	M	S	M	S	S

S Strong M Medium L Low

192PY1A5CC	SOLID STATE PHYSICS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Crystal Structures 11 h

Crystallography- Distinction between crystalline and amorphous solids –Crystal lattice – Basis – Crystal structure – Unit cell – Number of lattice points per unit cell- Bravais lattices – Miller indices – Structure of diamond and NaCl crystal – Atomic Packing – Atomic radius –-Lattice constant and density- Crystal structures (SC, HCP, FCC, BCC) – Interplanar distance.

Unit II Bond Theory and Thermal Properties of Solids 10 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 9 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 –Ferrites in computer Memories.

Unit IV Dielectric Properties 9 h

Band theory of solids – Classification of insulators, Semiconductors, conductors – Intrinsic and extrinsic semiconductor – Carrier concentration for electron - Barrier Potential Calculation - Polarization – Types of polarizability- Dielectric constant and displacement vector - Dielectric loss - Clausius Mosotti relation.

Unit V Superconductivity 9 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 Super Conductivity - BCS theory - Application of Superconductors - High temperature superconductors.

Text Books

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

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

References

1 Murugeshan R. and KiruthigaSivaprasath Er, 2008," Modern Physics",S Chand and Co, New Delhi.

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

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

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

192PY1A5CP	CORE PRACTICAL:SOLID STATE PHYSICS	SEMESTER - V

Total Credits: 2
Total Instructions Hours: 48h

S.No	List of Experiments
1	Determination of band gap and resistivity of semiconductor at different temperatures by Four Probe Method.
2	Determination of band gap and resistivity of metal at different temperatures by Four Probe Method.
3	Study the Hall coefficient of given p- type materials and obtain the charge carrier density in each case and study the Hall mobility.
4	Study the Hall coefficient of given n- type materials and obtain the charge carrier density in each case and study the Hall mobility.
5	Determination of the velocity and compressibility of the given liquid water using ultrasonic interferometer.
6	Determination of the velocity and compressibility of the given liquid kerosene using ultrasonic interferometer.
7	Study the magnetic susceptibility of given diamagnetic substances.
8	Find the band gap energy, Specific resistance of a semiconductor – Thermal Method.
9	Analyze the I-V Characteristics of a solar cell.
10	Study the V- I characteristics of a thermistor.
11	Calculate the Energy gap of a semiconductor using meter bridge.
12	Determination of Fermi energy of copper using meter bridge.

Note: Any 10 Experiments

References

1. Geeta Sanon, R., 2009. "B.Sc. Practical Physics", 2nd Ed., S.Chand&Co., New Delhi,
2. Flint B. L., Worsnop H. T., 2000, " Advanced Practical Physics for students", Asia Publishing House.
3. I.Prakash& Ramakrishna, 2011,"A Textbook of Practical Physics",11th Ed,KitabMahal.
4. J.P. Srivastava, 2006,"Elements of Solid-State Physics", 2nd Ed, Prentice-Hall of India.

192PY1A5CQ	CORE PRACTICAL: PROGRAMMING IN C	SEMESTER V

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
1	Write a C program to find the roots of Quadratic Equation Ax2+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 R1, R2 and R3 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.
13	Write a C program to arrange the given numbers in Ascending and Descending order.
14	Write a C program to check whether the given number is Palindrome or not.
15	Write a C program to find the Factorial of a numbers using recursive function.

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
192PY1A5SA	PRINCIPLES OF PROGRAMMING CONCEPTS AND C PROGRAMMING	SEC	3	-	-	3

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	Learn the fundamentals of C programming	K1
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	Expose the concepts of C programming in Physics problem solving	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A5SA	PRINCIPLES OF PROGRAMMING CONCEPTS AND C PROGRAMMING	SEMESTER V

Total Credits: 3

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 8 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 7 h

Conversion of Temperature from C to F and F to C – Determination of Velocity of Light – Foucalt'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 Curve.

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.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A5DA	GEOPHYSICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concept of solar systems.
- The importance of gravity and concept of earthquake.
- The fundamentals and various equations in seismology.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss the basics of solar systems and itsproperties.	K2
CO2	Demonstrate gravity along with size and shape of Earth.	K3
CO3	Explain the basics of seismic waves and surface waves.	K4
CO4	Infer theories of earth structure and seismology.	K4
CO5	Evaluate the concepts of earthquake and its measurements.	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A5DA	GEOPHYSICS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I The earth as aplanet 10 h

The solar system: The discovery and description of the planets - Kepler's laws of planetary motion - Characteristics of the planets - The origin of the solar system. The dynamic earth: Historical introduction - Continental drift - Earth structure – Hotspots.

Unit II Gravity and the figure of the earth 9 h

Earth's size -Earth's shape – The law of universal gravitation - Potential energy and work - Gravitational acceleration - Gravitational potential - Acceleration and potential of a distribution of mass - Mass and mean density of the Earth - Centripetal and centrifugal acceleration - Changes in Earth's rotation - Effect of lunar tidal friction on the length of the day - Increase of the Earth–Moon distance.

Unit III Basic seismological theory 10 h

The seismic wave equation - Plane waves -Spherical waves - P and S waves - Energy in a plane wave - Surface waves –Introduction- Rayleigh waves in a homogeneous half space - Love waves in a layer over a half space - Love wave dispersion.

Unit IV Seismology and earth structure 9 h

Seismic waves in a spherical earth - Ray paths and travel times - Velocity distributions - Travel time curve inversion
Anisotropic earth structure - General considerations - Transverse isotropy and azimuthal anisotropy- Anisotropy of minerals and rocks - Anisotropy of composite structures - Anisotropy in the lithosphere and the asthenosphere - Anisotropy in the mantle and the core.

Unit V Earthquakes 10 h

Focal mechanisms -Fault geometry - First motions - Body wave radiation patterns- Stereographic fault plane representation - Analytical representation of fault geometry - Earthquake geodesy - Measuring ground deformation - Coseismic deformation - Joint geodetic and seismological earthquake studies - Interseismic deformation and the seismic cycle.

Text Books

1. Lowrie. W, 2007, "Fundamentals of Geophysics", 2nd Edition, Cambridge University Press & New York
2. Stein. S, Wysession. M,2005, "An Introduction to Seismology, Earthquakes, and Earth Structure", Blackwell publishing Ltd &Australia

References

1. Garland. G.D, l979, "Introduction to Geophysics", 11th edition, WB Saunder Company &London
2. Cook. A.H, 1973, "Physics of the Earth and Planets",1 st edition, McMillan Press & London

Course Code	Course Name	Category	L	T	P	Credit
192PY1A5DB	ASTRO PHYSICS	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	Recall Solar 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	S	S	M	S	S
CO2	M	S	S	M	S
CO3	S	S	M	M	M
CO4	S	M	S	M	S
CO5	S	S	M	M	S

S Strong M Medium L Low

192PY1A5DB	ASTRO PHYSICS	SEMESTER V

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Astronomical Instruments 10 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 14 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 12 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 12 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 12 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
192PY1A5DC	MEDICAL PHYSICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Production of X rays and its characteristics.
- Radiation, its interaction with matter and detectors.
- Medical imaging, Radiation therapy and radiation protection

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the characteristics and production of X rays.	K2
CO2	Summarize the theory of radiation and Radiation Chambers	K2
CO3	Explain the principle and function of various imaging systems	K2
CO4	Discuss therapy techniques and its impact.	K2
CO5	Make use of principles of radiation protection.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A5DC	MEDICAL PHYSICS	SEMESTER V

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 - Tube cooling - Stationary mode - Rotating anode X-ray tubes - Quality and intensity of x-ray - X-ray generator circuits - Half wave and full wave rectification - Filament circuit - Kilo voltage circuit.

Unit II Radiation Physics 10 h

Radiation units - Exposure - Absorbed dose - Rad gray - Kera relative biological effectiveness - Effective dose - Inverse square law - Interaction of radiation with matter - Radiation Detectors -Thimble chamber - Condenser chambers - Geiger counter - Ionization chamber - Dosimeters - Survey methods - TLD and semiconductor detectors.

Unit III Medical Imaging Physics 9 h

Radiological imaging - Radiography - Filters - Grids - cassette - X-ray film – Film processing - Fluoroscopy - Computed tomography scanner - Generations - Mammography - Ultrasound imaging - Magnetic resonance imaging - Thyroid uptake system - Gamma camera (Only Principle, function and display).

Unit IV Radiation Therapy Physics 10 h

Radiotherapy - Kilo voltage machines - Deep therapy machines - Tele-cobalt machines - Medical linear accelerator - Basics of Teletherapy units - Radiation protection - External beam characteristics - Phantom - Dose maximum and build up - Bolus - Percentage depth dose - Tissue - Air ratio - Back scatter factor.

Unit V Radiation Protection 9 h

Principles of radiation protection - Protective materials - Radiation effects - Somatic, genetic stochastic and deterministic effect - Personal monitoring devices - TLD film badge - Pocket dosimeter.

Text Books

1 Thayalan, K,2017,"Basic Radiological Physics", Health Science Publications.

2 Khan, F.M, 2003, "Physics of Radiation Therapy", 3rd edition, Williams and Wilkins, The United States.

References

1 Chandra, 1998, "Nuclear Medicine Physics",Lippincot Williams and Wilkins, The United States.

2 John ,R.Gunniingham, Johns, H.E, 1990, "The Physics of Radiology ", Charles C. Thomas, The United States.

3 William, R.Hendee, 1992, "Medical Imaging Physics ",3rd edition, Mosby Publications, The United States.

4 Govindarajan, K.N, 1992, "Advanced Medical Radiation Dosimetry ", Prentice - Hall of India Private Limited, New Delhi.

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

PREAMBLE

This course has been designed for students to learn and understand

- the art of using different research methods and techniques
- planning and writing of researchproposals and dissertations, as well as a thesis
- the necessity for research ethics and guidelines to pursue research

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	learn thebasics of the research methods and techniques	K1
CO2	remember the hypothesis, laws related to research problem	K1
CO3	understand the limitations of experimentation in research	K2
CO4	illustrate the concept of interdisciplinary and multidisciplinary research	K3
CO5	analyze the ethics and responsibilities of research	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192MT1A5AA	RESEARCH METHODOLOGY	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introductionto Research 4 h

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

Unit II Hypotheses, Theories and Laws 6 h

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

Unit III Experimentationand research 5 h

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

Unit IV Scientific method and Research Design 4 h

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

Unit V Ethics and Responsibility in Scientific Research 5 h

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

Text Books

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

References

1 Thomas, C.G. (2015) Research Methodology and Scientific Writing.Ane Books Pvt. Ltd.: New Delhi.

2 Locharoenrat, K. (2017) Research Methodologies for Beginners.Pan Stanford Publishing: Singapore.

3 Ranjit Kumar, (2014) Research Methodology: A Step-by-Step Guide for Beginners. SAGE Publications Ltd.: Singapore.

4 Kothari, C.R. Garg, G. (2009) Research Methodology Methods and Techniques. New Age International Publishers, New Delhi..

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part-III										
192PY1A6CA	CORE-X	Relativity and Quantum Mechanics	4	1	-	3	25	75	100	4
192PY1A6CP	Core Practical -VII	Microprocessors and Digital Electronics	-	-	4	3	40	60	100	2
192PY1A6SA	SEC-IV	Microprocessors and Digital Electronics	3	-	-	3	25	75	100	3
192PY1A6DA/ 192PY1A6DB/ 192PY1A6DC	DSE-II	Introduction to Nanoscience/ Fibre optics and Optoelectronics/ Lasers and Applications	4	-	-	3	25	75	100	4
192PY1A6DD/ 192PY1A6DE/ 192PY1A6DF	DSE-III	Materials Science/ Solar Photovoltaic Technology/ Biomedical Instrumentation	4	-	-	3	25	75	100	4
192PY1A6CV	Project	Project		-	8	3	40	60	100	4
Part - IV										
193BC1A6AA	AECC-VI	Innovation, IPR and Entrepreneurship	2	-	-	3	-	-	50	2
Part-V										
192PY1A6XA		Extension Activity	-	-	-	-	50	-	50	1
		Total	**17**	**1**	**12**				**700**	**24**
						Grand Total			**4400**	**140**

Course Code	Course Name	Category	L	T	P	Credit
192PY1A6CA	RELATIVITY AND QUANTUM MECHANICS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The special theory of relativity.
- The basic principles of wave mechanics.
- The Schrödinger 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	K3
CO4	Apply the concepts of Schrödinger equation to one dimensional problem	K2
CO5	Extend the quantum mechanical concepts to three dimensional problem	K2

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A6CA	RELATIVITY AND QUANTUM MECHANICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Special Theory of Relativity 12 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 Properties of Matter 12 h

Introduction – 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 experiments – G P Thomson's experiments.

Unit III Uncertainty Principle 12 h

Introduction – 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 – Application – Non-existence of free electrons in the nucleus – Size and energy in the ground state of hydrogen atom.

Unit IV Schrödinger Equation 12 h

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

Unit V Angular Momentum in Quantum Mechanics 12 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 Sivaprasath, 2008, "Modern Physics", S. Chand and Co., New Delhi.
2. Mathews P.M. and Venkatesan S, 2005, "A Text book of Quantum Mechanics", Tata Mc-Graw Hill, New Delhi.

References

1. Gupta, Kumar and Sharma, 2015, "Quantum Mechanics", 3rd Edition, Jai Prakash Nath Publications, Meerut.
2. Aruldas G, 2017, "Quantum Mechanics", 2nd Edition, PHI Learning, New Delhi.
3. Thangappan V.K, 2018, "Quantum Mechanics", New Age Publication, New Delhi.
4. E-book: David J Griffiths and Darrell F Schroeter, 2018, "Introduction to Quantum Mechanics", 3rd Edition, Cambridge University Press, UK.

192PY1A6CP	CORE PRACTICAL: MICROPROCESSORS AND DIGITAL ELECTRONICS	SEMESTER VI

Total Credits: 2
Total Instructions Hours: 48h

S.No	List of Experiments
1	8085 ALP for 8 bit Addition and Subtraction.
2	8085 ALP for 8 Bit Multiplication and Division.
3	8085 ALP for finding the Biggest number element in the array and Sum of the elements in the Array.
4	8085 LED Interface.
5	8085 Traffic Light Controller.
6	OP-AMP –Adder and Subtractor.
7	OP-AMP-Inverting and non-inverting.
8	OP-AMP-Integrator and differentiator.
9	Verification of De Morgan's theorem.
10	Astable multivibrator using OP-AMP.
11	4-bit Adder and Subtractor-IC 7483.
12	Study of RS Flip Flop.

Note: Any 10 experiments

References

1. Mathur A.P, 2001,"Introduction to Microprocessor", Tata Mc-GrawHill, India.
2. Nagoor Kani, 2015,"Microprocessors and Micro Controllers", Tata McGraw-Hill Education, India.
3. Praod Borol, 2014, "8085 Microprocessor Architecture and Programming", Ane Books Pvt. Ltd., New Delhi.
4. Jain R.P, 2018,"Modern Digital Electronics", Mc-Graw Hill Education Pvt. Ltd., India.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A6SA	MICROPROCESSORS AND DIGITAL ELECTRONICS	SEC	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	K3
CO3	Outline the microprocessor architecture and assembly languages	K2
CO4	Explain memory and I/O devices	K2
CO5	Apply instructions to write assembly language programming	K3

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A6SA	MICROPROCESSORS AND DIGITAL ELECTRONICS	SEMESTER VI

Total Credits: 3

Total Instruction Hours: 36 h

Syllabus

Unit I Number System, Binary Arithmetic and Codes 8 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 code.

Unit II Boolean Algebra, Logic Gates and Arithmetic Circuits 7 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 7 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 7 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 7 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. E-book: Godse A.P, Godse D.A, 2008, "Microprocessors and Microcontroller System" Technical Publications, Pune.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A6DA	INTRODUCTION TO NANOSCIENCE	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	Contrast the dimension of nanostructures with their properties	K2
CO2	Experiment with the synthesis 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	S	L	S	S	S
CO2	S	M	S	S	S
CO3	S	L	S	S	S
CO4	S	M	S	S	S
CO5	S	L	S	S	S

S Strong M Medium L Low

192PY1A6DA	INTRODUCTION TO NANOSCIENCE	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Background to Nanoscience 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 Synthesis of Nanomaterials 9 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 Special Nanomaterials 9 h

Carbon Fullerenes – Carbon nanotubes – Random mesoporous structures – Core-shell structures: Metal oxide structures – Metal polymer structures – Nanocomposites and nano grained 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

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

Text Books

1 Guozhong Cao, 2017, “Nanostructures & Nanomaterials: Synthesis, Properties & Applications”, 2nd Edition, World Scientific Publishing Co. Pvt. Ltd.

2 Pradeep T, 2007,"Nano-The Essentials" Tata McGraw-Hill Publishing Company Limited, New Delhi.

References

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

2 Chattopadhyay K K and Banerjee AA, 2009, "Introduction to Nanoscience and Nanotechnology", PHI Learning Private Limited.

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

4 E-Book: Charles P. Poole Jr, Frank and Ownes, 2003, "Introduction to Nanotechnology", Sathyam Enterprise, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A6DB	FIBRE OPTICS AND OPTOELECTRONICS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The propagation of light waves in an optical fibre.
- The fibre fabrication and losses.
- The basic principles and detectors of optoelectronics devices.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the classification of optical fiber through mode of propagation	K2
CO2	Develop the optical fiber and test the cables during installation of cable based on cable selection criteria	K3
CO3	Analyze the attenuation and dispersion in an optical fibre	K4
CO4	Outline the light sources and the applications of optical fibre	K2
CO5	Categorize the detectors and parameter study in optoelectronics	K4

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

192PY1A6DB	FIBRE OPTICS AND OPTOELECTRONICS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fibre Classification 10 h

Propagation of light waves in an optical fibre – Acceptance angle and acceptance cone of a fibre – Numerical aperture (NA) – NA of a graded index fibre – Mode of propagation. Fibre classification: Stepped index fibre – Stepped index monomode fibre – Graded index multimode fibre – Comparison of step and graded index fibres.

Unit II Fibre Fabrication and Cables 9 h

Fiber fabrication Techniques – External chemical vapour deposition – Characteristics – Internal chemical vapour deposition – Characteristics – Phasil system. Fibre cable construction – Losses incurred during installation of cable – Testing of cable – Cable selection criteria.

Unit III Fibre Losses and Dispersion 9 h

Attenuation in optic fibre – Rayleigh scattering losses – Absorption losses – Bending losses – Radiation induced losses – Inherent defect losses – Core and Cladding losses. Dispersion in an optical fibre – Intermodal dispersion – Chromatic dispersion – Dispersion power penalty – Total dispersion delay.

Unit IV Fibre Optic Light Sources and Application 10 h

LED – The process involved in LEDs – Structures of LED – Fibre LED Coupling – Modulation bandwidth and Spectral Emission of LEDs. Important applications of integrated optic fibre technology - Long haul communication - Video link - Satellite link – Computer link – Essential elements of computer network.

Unit V Optoelectronics 10 h

Optoelectronics - Characteristics of photo detectors - Types of Photo detectors - PN junction photo detectors - PIN photodiode - Avalanche photodiode - Photo transistor - Parametric study of detectors - Pyroelectric reflectometer - Pyroelectric Joule meter.

Text Books

1 Subir Kumar Sarkar, 2014, "Optical Fibres and Fibre Optic Communication Systems", 4th Edition, S.Chand and Co, New Delhi.

2 Gupta S.G, 2013, "Text book on Optical Fiber Communication and it's Applications", 2nd Edition, PHI Learning Private limited, New Delhi.

References

1 Thyagarajan K and Ajoy Ghatak, 2017, "Introduction To Fiber Optics", Cambridge University Press, New Delhi.

2 Sathish Kumar M, 2014, "Fundamentals of Optical Fibre Communication, 2nd Edition, PHI Learning Private Limited, New Delhi.

3 Thyagarajan K, 2007, "Fiber optic essentials", John Wiley & Sons, India.

4 E-book: Shiva Kumar and Jamal Deen M, 2014, "Fiber Optic Communications Fundamentals and Applications", 1st Edition, John Wiley & Sons, UK.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A6DC	LASERS AND APPLICATIONS	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	S	L	S	S	S
CO2	S	M	S	S	S
CO3	S	M	S	S	S
CO4	S	L	S	S	S
CO5	S	L	S	S	S

S Strong M Medium L Low

192PY1A6DC	LASERS AND APPLICATIONS	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Basic Concepts and Principle 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) - Conditions for large stimulated emissions – Condition for light amplification – Population inversion – Pumping methods – Active medium – Metastable states.

Unit II Properties of Lasers 10 h

Amplification and gain – Optical resonator and its action – Threshold condition for lasing – Condition for steady state oscillation – Line broadening – Natural broadening – Collision broadening – Doppler broadening - Saturation intensity of laser – Laser operating frequencies – Cavity configurations – Laser modes – Single mode operation - Levels of laser action: 2 level system - 3 level, 4 level laser system and its comparison.

Unit III Types of Lasers 10 h

Classification of lasers - Solid state laser - Ruby laser - Nd:YAG laser - Gas laser - He-Ne laser – CO_2 laser - Chemical and 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, and Hemne P.S, 2017, "An Introduction to Lasers theory and applications", S. Chand and Co, New Delhi.

2 Thakur S.N, and Rai D.K, 2013, "Atom, Laser and Spectroscopy" 2nd edition, PHI Learning Private Ltd, New Delhi.

References

1 Mohan S, Arjunan V, Selvarani M, Kanchana Mala M, 2012, "Laser Physics", MJP Publishers, Chennai.

2 Nair K P R, 2009, "Atoms, Molecules and Lasers", Narosa publisher, India.

3 Murugasen R and Kiruthiga Sivaprakash, 2014,"Optics and Spectroscopy", 10th edition, S. Chand and Company, Pvt. Ltd., New Delhi.

4 E-Book: Thyagarajan K, Ajoy Ghatak, 2010, "Lasers Fundamentals and Applications" 2nd edition, Springer.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A6DD	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	S	L	S	S	S
CO2	S	L	S	S	S
CO3	S	L	S	S	S
CO4	S	L	S	S	S
CO5	S	M	S	S	S

S Strong M Medium L Low

192PY1A6DD	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 – Viscoelastic behavior – 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 - Equipment's 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
192PY1A6DE	SOLAR PHOTOVOLTAIC TECHNOLOGY	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts of PN junction diode into 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 cell 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	S	L	S	S	S
CO2	S	M	S	S	S
CO3	S	L	S	S	S
CO4	S	M	S	S	S
CO5	S	M	S	S	S

S Strong M Medium L Low

192PY1A6DE	SOLAR PHOTOVOLTAIC TECHNOLOGY	SEMESTER VI

Total Credits: 4
Total Instructions Hours: 48h

Syllabus

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

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 - IV equation of solar cells - Solar cell characteristics.

Unit II Design of Solar Cells 10h

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 of efficiency - Effect of temperature on efficiency - Solar cell design.

Unit III Solar Photovoltaic Modules 10h

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

Unit IV Balance of Solar PV System 9h

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 9h

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 - Simple payback period.

Text Books

1. Chetan Singh Solanki, 2013, "Solar Photovoltaics: Fundamentals, Technologies and Applications", PHI Learing Pvt. Ltd., New Delhi.
2. Kothari D.P, Singal K.C and Rakesh Ranjan, 2008, "Renewable energy sources and emerging Technologies", Prentice Hall of India, India.

References

1. Gary Cook, Lynn Billman and Rick Adcock, 1995, “Photovoltaic Fundamental”, National Technical Information Service, U.S. Department of Energy, U.S.
2. Antonio Luque, 2012, "Hand Book of Photovoltaic Science and Engineering", Wiley, India.
3. Angele Reinders, 2017, "Photovoltaic Solar Energy From Fundamentals to Applications", Wiley, India.
4. E-book: Dmitry Shevela, Lars Olof Bjorn, Govindjee, 2012, "Photosynthesis: Solar Energy For Life", World Scientific Publishing Co. Pvt. Ltd.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A6DF	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	S	L	S	S	S
CO2	S	M	S	S	S
CO3	S	L	S	S	S
CO4	S	M	S	S	S
CO5	S	L	S	S	S

S Strong M Medium L Low

192PY1A6DF	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 - 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 - Cardio tachometers - 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
193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

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

COURSE OUTCOMES

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

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

MAPPING WITH PROGRAMME OUTCOMES

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

S Strong M Medium L Low

193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	SEMESTER VI

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Innovation, IPR and Entrepreneurship 05 h

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

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

Unit II Patents 05 h

Introduction and origin of Patent System in India- Conceptual Principles of Patent Law in India - Process for obtaining patent - Rights granted to a Patentee - Infringement of Patent.
Case Study: When Google was used for Patent Infringement.

Unit III Trademarks 05 h

Origin of Trade Marks System - Types - Functions - Distinctiveness and Trademarks - Meaning of Good Trademark - Rights granted by Registration of Trademarks - Infringement of trademark.
Case Study: Trademark mismanagement by Cadbury's.

Unit IV Copyright 05 h

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

Unit V Geographical Indications 04 h

Introduction and Concept of Geographical Indications - History - Administrative Mechanism - Benefits of Geographical Indications - Infringement of registered Geographical Indication.
Case Study: The story of the Tirupati Laddu.

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

Text Book

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

References

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