B.Sc. PHYSICS

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Students admitted from 2020 onwards
PREAMBLE

The B.Sc. Physics course is conducted with the following objectives:

- To update the knowledge of the students in one of the most important basic sciences, namely PHYSICS.

- To update the knowledge of a person in the latest fields of science like Atomic and Nuclear Physics, Laser Physics, Materials Science, Nano Technology, Astrophysics etc.

- To motivate and support young talented researchers in their research activities.

- To prepare the students to fit into National Laboratories like CSIR laboratories and National Physical Laboratories etc., as working personnel. Also to make them to work in Universities and colleges as teachers.

- To enhance the knowledge of the structure and evolution of the Universe, fundamental properties of matter and energy through the support of leading edge research.

- To provide efficient and resourceful hands to help in inter-disciplinary areas where basic and advanced knowledge in physics is utilized.
KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established under Section 3 of UGC Act, 1956)
Eachanari Post, Coimbatore - 641 021, India
FACULTY OF ARTS, SCIENCE AND HUMANITIES
UNDER-GRADUATE PROGRAMMES
REGULAR MODE
REGULATIONS - 2020

The following Regulations are effective from the academic year 2020-2021 and are applicable to candidates admitted to Under Graduate Degree (UG) programmes in the Faculty of Arts, Science, and Humanities, Karpagam Academy of Higher Education (KAHE) from the academic year 2020-2021 onwards.

1 PROGRAMMES OFFERED, MODE OF STUDY AND ADMISSION REQUIREMENTS

1.1 U.G. Programmes Offered
A candidate may undergo a programme in any one of the under graduate programme approved by the KAHE as given below.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>DEGREE</th>
<th>DISCIPLINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B. Sc.</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>2</td>
<td>B. Sc.</td>
<td>Biotechnology</td>
</tr>
<tr>
<td>3</td>
<td>B. Sc.</td>
<td>Computer Science</td>
</tr>
<tr>
<td>4</td>
<td>B.Sc.</td>
<td>Mathematics</td>
</tr>
<tr>
<td>5</td>
<td>B.Sc.</td>
<td>Physics</td>
</tr>
<tr>
<td>6</td>
<td>B. Sc.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>7</td>
<td>B. Sc.</td>
<td>Microbiology</td>
</tr>
<tr>
<td>8</td>
<td>B. Sc.</td>
<td>Information Technology</td>
</tr>
<tr>
<td>9</td>
<td>B. Sc.</td>
<td>Computer Technology</td>
</tr>
<tr>
<td>10</td>
<td>B.Sc.</td>
<td>Computer Science with Cognitive Systems</td>
</tr>
<tr>
<td>11</td>
<td>BCA</td>
<td>Computer Application</td>
</tr>
<tr>
<td>12</td>
<td>B.Sc.</td>
<td>Applied Science (Material Science)</td>
</tr>
<tr>
<td>13</td>
<td>B.Sc.</td>
<td>Applied Science (Foundary Science)</td>
</tr>
<tr>
<td>14</td>
<td>B. Com.</td>
<td>Commerce</td>
</tr>
<tr>
<td>15</td>
<td>B.Com (CA)</td>
<td>Commerce with Computer Applications</td>
</tr>
<tr>
<td>16</td>
<td>B. Com. (PA)</td>
<td>Commerce with Professional Accounting</td>
</tr>
<tr>
<td>17</td>
<td>B. Com. (BPS)</td>
<td>Commerce with Business Process Services</td>
</tr>
<tr>
<td>18</td>
<td>B.B.A.</td>
<td>Business Administration</td>
</tr>
</tbody>
</table>

1.2 Mode of Study

Full-Time
All programs are offered under Full-Time Regular mode. Candidates admitted under ‘Full-Time’ should be present in the KAHE during the complete working hours for curricular, co-curricular and extra-curricular activities assigned to them.
1.3 Admission Requirements (Eligibility)

A candidate for admission to the first year of the UG Degree programme shall be required to have passed the Higher Secondary Examination (10 + 2) [Academic or Vocational] prescribed by the Government of Tamil Nadu Board or any similar examination of any other Board accepted by the KAHE as equivalent thereto.(Annexure I)

2. DURATION OF THE PROGRAMMES

2.1 The minimum and maximum period for the completion of the U.G. Programmes are given below:

<table>
<thead>
<tr>
<th>Programme</th>
<th>Min. No. of Semesters</th>
<th>Max. No. of Semesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Sc., B.Com, BCA, BBA</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

2.2 Each semester normally consists of 90 working days or 450 Instructional hours of study. Examination shall be conducted at the end of every semester for the respective courses.

3. CHOICE BASED CREDIT SYSTEM

3.1. All programmes are offered under Choice Based Credit System with a total credit of 140 for UG Programmes.

3.2. Credits

Credit means the weightage given to each course of study by the experts of the Board of Studies concerned. Total credits 140 as per UGC Guidelines for the UG programme (Three Years).

4. STRUCTURE OF THE PROGRAMME

4.1 Tamil or any one of the Indian / Foreign Languages viz, Malayalam, Hindi, French, Sanskrit are offered as an additional course for Science Programme. Four credits are awarded for each course and the examinations will be conducted at the end of the each semester.

For Arts programme, there are two additional courses (English III and IV) offered during the Second year - third and fourth semesters. Six credits are awarded for each course, and the examinations will be conducted at the end of the respective semester.

4.2. Core Course, Discipline Specific Elective, Generic Elective, Skill Enhancement Course, Project, Ability Enhancement Course are part of curricular structure.

4.2.1. Core Course

Core course consists of theory and practical for Department domains for which examinations shall be conducted at the end of each semester. The students have to study 12 Core Courses compulsorily.

4.2.2. Discipline Specific Electives (DSE)

DSE is offered in the fifth and sixth semesters of third year. The examination shall be conducted at the end of each semester. Final year students (V and VI Semesters) will...
have to choose the elective courses in V semester and VI Semester from the list of elective courses given in the curriculum, in addition to the project work.

4.2.3. **Generic Elective**

Generic elective is an elective course chosen generally from an unrelated discipline/subject, with an intention to provide exposure in other areas of interest also to students.

The students have to choose two Generic Electives- one each in the First year (3 or 4 courses) and second year (3 or 4 courses) of the programme from the list of elective courses given in the curriculum.

**Note:** A particular elective course will be offered only if at least one third of the students in a class opt that course. If less, the elective selected has to be studied as a self-study course only.

4.2.4. **Skill Enhancement Courses**

Skill Enhancement Courses are offered in the third and fourth semesters of second year programme and in the fifth and sixth semesters of the third year programme. Second year students (III and IV Semesters) will have to choose at least one elective course each in both III and IV Semesters from the list of elective courses given in the curriculum. Similarly final year students (V and VI Semesters) will have to choose at least one elective course each in both V and VI Semesters from the list of elective courses given in the curriculum. The examination shall be conducted at the end of each semester.

**Note:** A particular elective course will be offered only if at least one third of the students in a class opt that course. If less, the elective selected has to be studied as a self-study course only.

4.2.5. **Project Work**

The project work shall start at the beginning of sixth semester and the Project Report has to be submitted at the end of the sixth semester. The project may be an individual or group task. HoD of the department concerned shall assign a project supervisor who in turn shall monitor the project work of the student(s). A project/dissertation work may be given *in lieu* of a discipline-specific elective paper.

4.2.6. **Ability Enhancement Course**

**Ability Enhancement Course-1**

The course (English for Science Programme / Business Communication for Arts Programme) shall be offered during the first and second semester for which examinations shall be conducted at the end of the semester. And Business Communication for Arts Programme shall be offered during the first semester for which examinations shall be conducted at the end of the semester.

**Ability Enhancement Compulsory Course-2**

Students shall study the course Environmental Studies in the First / Second Semester.
for which examinations shall be conducted at the end of the semester.

4.2.7. Internship

The student shall undergo 15 days internship in the end of II and IV semester.

5.0 Value Added Courses

Courses of varying durations but not less than 30 hours which are optional and offered outside the curriculum that add value and helping the students in getting placement. Students of all programmes are eligible to enroll for the value added course. The student can choose one Value-added course per semester from the list of Value-added courses available in KAHE. The examinations shall be conducted at the end of the value added course at the Department level and the student has to secure a minimum of 50% of marks to get a pass. The certificate for the value added course for the passed out students shall be issued duly signed by the HOD and Dean of the Faculty concerned.

6.0 Online Course

Student shall study at least one online course from SWAYAM / NPTEL / MOOC in any one of the first five semesters for which examination shall be conducted at the end of the course by the respective external agencies if any. The student can register to the courses which are approved by the Department. The student shall produce a Pass Certificate from the respective agencies before the end of the fifth semester. The credit(s) earned by the students will be considered as additional credit(s) over and above the credits minimum required to earn a particular degree.

7.0 Extension Activities

Every student is encouraged to participate in at least any one of the following Extension activities:

- NSS
- NCC
- Sports / Mass drill
- YRC
- Club activities
- Other Co-curricular and Extra curricular activities

The student’s performance shall be examined by the staff in-charge of Extension Activities along with the faculty mentor and the Head of the respective department on the following parameters.

- 75 % weightage for active participation in Extension Activities in / out of the KAHE.
- 25 % weightage for Exemplary Awards / Honours / Prizes secured.

8.0 Marks for Co-curricular and Extra-curricular shall be sent to the CoE before the commencement of the Sixth End Semester Examinations.

The above activities shall be conducted outside the regular working hours of the KAHE.
5. MEDIUM OF INSTRUCTION
The medium of instruction and examinations for the courses under Language I – Tamil / Hindi / Malayalam / French / Sanskrit shall be in the language concerned. For all other courses, the medium of instruction and examination shall be in English.

6. MAXIMUM MARKS
Each of the theory and practical courses shall carry a maximum of 100 marks. Out of which 40 marks is awarded for Continuous Internal Assessment (CIA) and 60 marks for End Semester Examinations (ESE).

Evaluation: Evaluation in the courses comprises two parts, one is the Continuous Internal Assessment (CIA) and the other one is the End Semester Examination (ESE).

7. REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

a. Ideally, every student is expected to attend all classes and secure 100% attendance. However, in order to allow for certain unavoidable circumstances, the student is expected to attend at least 75% of the classes and the conduct of the candidate has been satisfactory during the course.

b. A candidate who has secured attendance between 65% and 74% (both included), due to medical reasons (Hospitalization / Accident / Specific Illness) or due to participation in University / District / State / National / International level sports or due to participation in Seminar / Conference / Workshop / Training Programme / Voluntary Service / Extension activities or similar programmes with prior permission from the Registrar shall be given exemption from prescribed minimum attendance requirements and shall be permitted to appear for the examination on the recommendation of the Head of the Department concerned and Dean to condone the shortage of attendance. The Head of the Department has to verify and certify the genuineness of the case before recommending to the Dean concerned. However, the candidate has to pay the prescribedcondonation fee to the KAHE.

c. However, a candidate who has secured attendance less than 64% in the current semester due to any reason shall not be permitted to appear for the current semester examinations. But he/she will be permitted to appear for his/her supplementary examinations, if any and he/she has to re-do the same semester with the approval of the “Students’ Affairs Committee” and Registrar.

8. a. FACULTY MENTOR
To help students in planning their courses of study and for general advice on the academic programme, the HoD shall allot twenty students to a faculty who will function as faculty mentor throughout their period of study. Faculty mentor shall advise the students and monitor their behavior and academic performance. Problems if any shall be counseled by them periodically. The Faculty mentor is also responsible to inform the parents of their wards’ progress. Faculty mentor shall display the cumulative attendance particulars of his / her ward students’ periodically (once in 2 weeks) on the Notice Board to enable the students, know their attendance status and satisfy the clause 7 of this regulation.
b. ONLINE COURSE COORDINATOR
To help students in planning their online courses and for general advice on online courses, the HOD shall nominate a coordinator for the online courses. The Online course coordinator shall identify the courses which students can select for their programme from the available online courses offered by the different agencies periodically and inform the same to the students. Further, the coordinators shall advice the students regarding the online courses and monitor their course.

9. CLASS COMMITTEE
Every class shall have a Class Committee consisting of the faculty members of the various courses of the class concerned, student representatives (Minimum 2 boys and 2 girls of various capabilities and Maximum of 6 members) and the concerned HoD / senior faculty as Chairperson. The objective of the Class Committee Meeting is all about the teaching – learning process. Class Committee shall be convened at least once in a month. The functions of the Class Committee shall include

- Analysing and solving problems experienced by students in the class room and in the laboratories.
- Analyzing the performance of the students of the class after each test and finding the ways and means to improve the performance.
- The Class Committee of a particular class of any department is normally constituted by the HoD / Chairperson of the Class Committee. However, if the students of different departments are mixed in a class, the Class Committee shall be constituted by the respective Dean of the Faculty.
- The class committee shall be constituted during the first week of each semester.
- The HoD / Chairperson of the Class committee is authorized to convene the meeting of the class committee.
- The respective Dean of the Faculty has the right to participate in any Class committee meeting.
- The Chairperson is required to prepare the minutes of every meeting, and submit the same to Dean concerned within two days after having convened the meeting. Serious issues if any shall be brought to the notice of the Registrar by the HoD / Chairperson immediately.

10. COURSE COMMITTEE FOR COMMON COURSES
Each common theory course offered to more than one discipline or department shall have a “Course Committee” comprising all the teachers handling the common course with one of them nominated as Course Coordinator. The nomination of the course coordinator shall be made by the respective Dean depending upon whether all the teachers handling the common course belong to a single department or to various other departments. The ‘Course Committee’ shall meet in order to arrive at a common scheme of evaluation for the tests to ensure a uniform evaluation of the tests. If feasible, the course committee shall prepare a common question paper for the Internal Assessment test(s).

11. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
11.1 **Attendance and assessment:** Every Faculty is required to maintain an Attendance and Assessment Record (Log book) which consists of attendance of students marked for each lecture / practical / project work class, the test marks and the record of class work (topic covered), separately for each course. This should be submitted to the HoD once in a fortnight for checking the syllabus coverage and the records of test marks and attendance. The HoD shall sign with date after due verification. The same shall be submitted to respective Dean once in a month. After the completion of the semester the HoD should keep this record in safe custody for five years. Because records of attendance and assessment shall be submitted for Inspection as and when required by the KAHE / any other approved body.

11.2 **Continuous Internal Assessment (CIA):** The performance of students in each course will be continuously assessed by the respective faculty as per the guidelines given below:

### Theory Courses

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Category</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Assignment*</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Attendance</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Seminar</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Test – I (1½ units- Unit I and II)</td>
<td>8</td>
</tr>
<tr>
<td>5.</td>
<td>Test – II (1½ units Unit II and III)</td>
<td>8</td>
</tr>
<tr>
<td>6.</td>
<td>Test III (2 units Unit IV and V)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td><strong>Continuous Internal Assessment : Total</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

* Two Assignments (Assignment I before Internal Test – I and assignment II before Internal Test – II).

### Practical Courses

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Category</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Attendance</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Observation work</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Record work</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Model Examination</td>
<td>20</td>
</tr>
<tr>
<td>5.</td>
<td>Viva – voce [Comprehensive]*</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>Continuous Internal Assessment: Total</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

* Includes Viva- voce conducted during the model Exam practical.

Every practical Exercise / Experiment shall be evaluated based on the conduct of Exercise/ Experiment and records maintained.
11.3 Pattern of Test Question Paper

Portions for Internal Test – I : First 1 ½ Units (Unit I and II)
Portions for Internal Test – II : Second 1 ½ Units (Unit II and III)
Portions for Internal Test – III : Two units (Unit IV and V)

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks</td>
<td>50 marks</td>
</tr>
<tr>
<td>Duration</td>
<td>2 Hours</td>
</tr>
<tr>
<td>Part – A</td>
<td>Objective type (20x1=20)</td>
</tr>
<tr>
<td>Part - B</td>
<td>Short Answer Type (3 x 2 = 6)</td>
</tr>
<tr>
<td>Part - C</td>
<td>3 Eight mark questions ‘either – or’ choice (3 x 8 = 24 Marks)</td>
</tr>
</tbody>
</table>

11.4 Attendance

Marks Distribution for Attendance

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Attendance (%)</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>91 and above</td>
<td>5.0</td>
</tr>
<tr>
<td>2</td>
<td>81 – 90</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>76 – 80</td>
<td>3.0</td>
</tr>
<tr>
<td>4</td>
<td>Less than 75</td>
<td>0</td>
</tr>
</tbody>
</table>

12. ESE EXAMINATIONS

12.1 End Semester Examination (ESE): End Semester Examination will be held at the end of each semester for each course. The question paper is for a maximum 60 marks.
**Pattern of ESE Question Paper:**

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks</td>
<td>60 marks for ESE.</td>
</tr>
<tr>
<td>Duration</td>
<td>3 hours (½ Hr for Part – A Online &amp; 2 ½ Hours for Part – B and C)</td>
</tr>
<tr>
<td>Part - A</td>
<td>20 Questions of 1 mark each (20 x 1 = 20 Marks) Question No. 1 to 20 Online Multiple Choice Questions</td>
</tr>
<tr>
<td>Part - B</td>
<td>5 Questions of 2 marks each (5 x 2 = 10 Marks) Question No. 21 to 25</td>
</tr>
<tr>
<td>Part - C</td>
<td>5 six mark Questions of 6 marks each (5 x 6 = 30 Marks.) Question No. 26 to 30 will be ‘either-or’ type, covering all five units of the syllabus; i.e., Question No. 26: Unit - I, either 26 (a) or 26 (b), Question No. 27: Unit - II, either 27 (a) or 27 (b), Question No. 28: Unit - III, either 28 (a) or 28 (b), Question No. 29: Unit - IV, either 29 (a) or 29 (b), Question No. 30: Unit - V, either 30 (a) or 30 (b)</td>
</tr>
</tbody>
</table>

12.2 **Practical:** There shall be combined valuation. The pattern of distribution of marks shall be as given below.

<table>
<thead>
<tr>
<th>Experiments</th>
<th>40 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record</td>
<td>10 Marks</td>
</tr>
<tr>
<td>Viva-voce</td>
<td>10 Marks</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60 Marks</strong></td>
</tr>
</tbody>
</table>

**Record Notebooks for Practical Examination**

Candidate taking the practical examination should submit Bonafide Record Notebook prescribed for the practical examination; failing which the candidate will not be permitted to take the practical examination.

In case of failures in Practical Examination, the marks awarded for the Record at the time of first appearance of the Practical Examination shall remain the same at the subsequent appearance also by the candidate.
12.3. Evaluation of Project Work

12.3.1 The project work shall carry a maximum of 100 marks. (CIA - 40 and ESE – 60*)

*Combined valuation of Internal and External Examiners.

12.3.2 The project report prepared according to the approved guidelines and duly signed by the supervisor(s) shall be submitted to HoD.

12.3.3 The evaluation of the project will be based on the project report submitted and a viva-voce Examination by a team consisting of the supervisor, who will be the Internal Examiner and an External Examiner who shall be appointed by the COE. In case the guide is not available, the HoD shall act as an Internal Examiner for the same.

12.3.4 If a candidate fails to submit the project report on or before the specified date given by the Examination Section, the candidate is deemed to have failed in the Project Work and shall re-enroll for the same in a subsequent semester.

If a candidate fails in the respective viva-voce examinations he/she has to resubmit the Project Report within 30 days from the date of declaration of the results. For this purpose the same Internal and External examiner shall evaluate the resubmitted report.

12.3.5 Copy of the approved project report after the successful completion of viva-voce examinations shall be kept in the KAHE library.

13. PASSING REQUIREMENTS

13.1 Passing minimum: There is a passing minimum 20 marks out of 40 marks for CIA and the passing minimum is 30 marks out of 60 marks in ESE. The overall passing in each course is 50 out of 100 marks (Sum of the marks in CIA and ESE examination).

13.2 If a candidate fails to secure a pass in a particular course (either CIA or ESE or Both) as per clause 13.1, it is mandatory that the candidate has to register and reappear for the examination in that course during the subsequent semester when examination is conducted for the same till he / she receives a pass both in CIA and ESE (vide Clause 2.1).

13.3 Candidate failed in CIA will be permitted to improve CIA marks in the subsequent semesters by writing tests and by re-submitting Assignments.

13.4 CIA marks (if it is pass) obtained by the candidate in the first appearance shall be retained by the Office of the Controller of Examinations and considered valid for all subsequent attempts till the candidate secures a pass in ESE.

13.5 Candidate who is absent in ESE in a Course / Practical / Project Work after having enrolled for the same shall be considered to have failed in that examination.

14. IMPROVEMENT OF MARKS IN THE COURSES ALREADY PASSED

Candidates desirous to improve the marks secured in a passed course in their first attempt shall reappear once (only in ESE) in the subsequent semester. The improved marks shall
be considered for classification but not for ranking. If there is no improvement there shall be no change in the marks awarded earlier.

15. AWARD OF LETTER GRADES

All assessments of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate in each course as detailed below:

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>Marks Range</th>
<th>Grade Point</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>91 - 100</td>
<td>10</td>
<td>OUTSTANDING</td>
</tr>
<tr>
<td>A+</td>
<td>81- 90</td>
<td>9</td>
<td>EXCELLENT</td>
</tr>
<tr>
<td>A</td>
<td>71-80</td>
<td>8</td>
<td>VERY GOOD</td>
</tr>
<tr>
<td>B+</td>
<td>66- 70</td>
<td>7</td>
<td>GOOD</td>
</tr>
<tr>
<td>B</td>
<td>61 – 65</td>
<td>6</td>
<td>ABOVE AVERAGE</td>
</tr>
<tr>
<td>C</td>
<td>55 - 60</td>
<td>5</td>
<td>AVERAGE</td>
</tr>
<tr>
<td>D</td>
<td>50 - 54</td>
<td>4</td>
<td>PASS</td>
</tr>
<tr>
<td>RA</td>
<td>&lt;50</td>
<td>-</td>
<td>REAPPEARANCE</td>
</tr>
<tr>
<td>AAA</td>
<td>-</td>
<td>-</td>
<td>ABSENT</td>
</tr>
</tbody>
</table>
16. GRADE SHEET
After the declaration of the results, Grade Sheets will be issued to each student which will contain the following details:

i. The list of courses enrolled during the semester and the grade scored.
ii. The Grade Point Average (GPA) for the semester and
iii. The Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards.
iv. Remark on Extension Activities (only in the 6th Semester Grade Sheet)

GPA of a Semester and CGPA of a programme will be calculated as follows.

\[
\text{GPA of a Semester} = \frac{\sum CiGPi}{\sum Ci} \\
\text{CGPA of the entire programme} = \frac{\sum \sum CniGPni}{\sum \sum Cni}
\]

where,

Ci is the credit fixed for the course ‘i’ in any semester
GPi is the grade point obtained for the course ‘i’ in any semester
‘n’ refers to the Semester in which such courses are credited.

**Note:** RA grade will be excluded for calculating GPA and CGPA.
17. REVALUATION
A candidate can apply for revaluation and retotalling of his / her semester examination answer script (theory courses only), within 2 weeks from the date of declaration of results, on payment of a prescribed fee. For the same, the prescribed application has to be sent to the Controller of Examinations through the HoD. A candidate can apply for revaluation of answer scripts not exceeding 5 courses at a time. The Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate through the HoD concerned. Revaluation is not permitted for supplementary theory courses.

18. TRANSPARENCY AND GRIEVANCE COMMITTEE
Revaluation and Re-totaling is allowed on representation (clause 17). Student may get the Xerox copy of the answer script on payment of prescribed fee, if he / she wishes. The student may represent the grievance, if any, to the Grievance Committee, which consists of Dean of the Faculty, (if Dean is HoD, the Dean of another Faculty nominated by the KAHE), HoD of the Department concerned, the faculty of the course and Dean from other discipline nominated by the KAHE and the CoE. If the Committee feels that the grievance is genuine, the script may be sent for external valuation; the marks awarded by the External examiner will be final. The student has to pay the prescribed fee for the same.

19. ELIGIBILITY FOR THE AWARD OF THE DEGREE
A student shall be declared to be eligible for the conferment of the Degree if he / she has

- Successfully completed all the components prescribed under Parts I to Part IV in the CBCS pattern to earn the minimum required credits as specified in the curriculum corresponding to his / her programme within the stipulated period vide class 2.1.
- Not any disciplinary action pending against him / her.
- The award of the degree must be approved by the Board of Management.

20. CLASSIFICATION OF THE DEGREE AWARDED
20.1 Candidate who qualifies for the award of the Degree (vide clause 19) having passed the examination in all the courses in his / her first appearance, within the specified minimum number of semesters and securing a CGPA not less than 8 shall be declared to have passed the examination in First Class with Distinction.
20.2 Candidate who qualifies for the award of the Degree (vide clause 19) having passed the examination in all the courses within the specified maximum number of semesters (vide clause 2.1), securing a CGPA not less than 6.5 shall be declared to have passed the examination in First Class.

20.3 All other candidates (not covered in clauses 20.1 and 20.2) who qualify for the award of the degree (vide Clause 19) shall be declared to have passed the examination in Second Class.

21. PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

21.1 Candidate, may for valid reasons and on prior application, be granted permission to withdraw from appearing for the examination of any one course or consecutive examinations of more than one course in a semester examination.

21.2 Such withdrawal shall be permitted only once during the entire period of study of the degree programme.

21.3 Withdrawal of application is valid only if it is made within 10 days prior to the commencement of the examination in that course or courses and recommended by the HoD / Dean concerned and approved by the Registrar.

21.3.1 Notwithstanding the requirement of mandatory TEN days notice, applications for withdrawal for special cases under extraordinary conditions will be considered on the merit of the case.

21.4 Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction. This provision is not applicable to those who seek withdrawal during VI semester.

21.5 Withdrawal from the End semester examination is NOT applicable to arrears courses of previous semesters.

21.6 The candidate shall reappear for the withdrawn courses during the examination conducted in the subsequent semester.

22. PROVISION FOR AUTHORISED BREAK OF STUDY

22.1 Break of Study shall be granted only once for valid reasons for a maximum of one year during the entire period of study of the degree programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons, and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the Registrar, but not later than the last date for registering for the end semester examination of the semester in question, through the Head of the Department stating the reasons therefore and the probable date of rejoining the programme.

22.2 The candidate thus permitted to rejoin the Programme after the break shall be governed by the Curriculum and Regulations in force at the time of rejoining. Such candidates may have to do additional courses as per the Regulations in force at that period of time.

22.3 The authorized break of study (for a maximum of one year) will not be counted for the duration specified for passing all the courses for the purpose of classification. (Vide
Clause 20). However, additional break of study granted will be counted for the purpose of classification.

22.4 The total period for completion of the Programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 2.1 irrespective of the period of break of study (vide clause 22.1) in order that he/she may be eligible for the award of the degree.

22.5 If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted ‘Break of Study’ or ‘Withdrawal’ (Clause 21 and 22) is not applicable for this case.

23. RANKING
A candidate who qualifies for the UG Degree programme passing all the Examinations in the first attempt, within the minimum period prescribed for the programme of study from Semester I through Semester VI to the programme shall be eligible for ranking. Such ranking will be confined to 10% of the total number of candidates qualified in that particular programme of study subject to a maximum of 10 ranks.

24. SUPPLEMENTARY EXAMINATION
Supplementary Examination will be conducted only for the final semester students within ten days from the date of publication of results for students who have failed in one theory course only. Such students shall apply with prescribed fee to the Controller of Examinations within the stipulated time.

25. DISCIPLINE
25.1. If a student indulges in malpractice in any of the Internal / External Examination he / she shall be liable for punitive action as prescribed by the KAHE from time to time.

25.2. Every student is required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the KAHE. The erring students will be referred to the disciplinary committee constituted by the KAHE, to enquire into acts of indiscipline and recommend the disciplinary action to be taken.

26. REVISION OF REGULATION AND CURRICULUM
The KAHE may from time to time revise, amend or change the Regulations, Scheme of Examinations and syllabi if found necessary.
# DEPARTMENT OF PHYSICS

**FACULTY OF ARTS, SCIENCE AND HUMANITIES**

**UG PROGRAM (CBCS) – B.Sc. Physics**

(2020–2021 Batch and onwards)

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**Semester – 1**

**Semester – 2**

**Semester – 3**

**Semester – 4**

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
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## B.Sc Physics 2020-2021

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Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
### B.Sc Physics 2020-2021

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### Skill Enhancement Courses (SEC)

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Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
PROGRAMME OUTCOMES

a) Be able to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

b) Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.

c) The graduate will have specialized knowledge and expertise to identify, formulate, investigate, analyze and implement on the problems in physical sciences.

d) Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.

e) Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.

f) Work and communicate efficiently in inter-disciplinary circumstances.

g) The graduate will have leadership quality to handle all kind of circumstances in diverse interdisciplinary and multidisciplinary learning environment.

h) Select, design and apply appropriate experimental techniques with computational tools to solve problems of physics.

i) Perform job in various fields’ viz. science, engineering and business, etc. with precision, analytical mind, innovative thinking, clarity of thought and expression, systematic approach.

j) Understand ethical principles and responsibilities of a physics graduate to serve the society.

PROGRAMME SPECIFIC OUTCOMES

k) Enhance the employable skills towards seeking appointments in the relevant areas.

l) Able to use advanced mathematical tools and algorithms to elucidate the practical problems.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To produce graduates who excel in the competencies and values required for leadership to serve a rapidly evolving global community.

PEO2: To provide the students with academic excellence, leadership qualities and professional ethics to address the needs of the scientific community.
PEO3: To create strong interest in physics so as students can further develop themselves through self-study.

PEO4: To equip the students with the ability to utilize the concepts of Physics such as optics, electricity, Magnetism, Thermodynamics etc and their applications in addressing the practical and heuristic issues.

PEO5: To provide the students with creative and analytical skills for the sustainable developments and nation building initiatives.

PEO 6: Use basic laboratory equipments and data analysis techniques, including, propagating errors, and also representing data graphically.

PEO 7: Basic computer programming skills like C, C++, Scilab used in Physics can be used to solve laboratory data analysis.

PEO 8: basic mathematical tools commonly used in physics, including differential and integral calculus, vector calculus, ordinary differential equations, partial differential equations, and linear algebra to solve advanced problems encountered in the fields of applied physics and engineering.

PEO 9: To create awareness on recent trends in technology and help them to pursue higher studies.

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களையம் பஞ்சார்க்கழகம்

• களையம் தனித்துவமான சில விளக்கக் கையலையும், களையத் தனிப்படையும் சில விளக்கக் கையலையும், அமைச்சுச் சில விளக்கக் கையலையும்.
• உருசியக்கல் வலுவற்றும் வருவன் தம்பரா பாதகத்தக் கையலையும்.
• பாருத்த மருத்துவப் படிப்புத்தகம் தமிழியம் தொட்டிக லாகம்
• மாணவரும் தொன்வாழ்வு, பல்வை பாதகத்தக் கையலையும்.
• தமிழ் விளக்கக் கையலையும் மாணவரும் தொட்டிக லாகம்

பஞ்சார்க்கழகம் பாதகத்தகம்

• தமிழ் வருவன் வருவன் தம்பரா பாதகத்தக் கையலையும், உருசியக்கல் வலுவற்றும் வருவன் தம்பரா பாதகத்தக் கையலையும், 'தமிழ் விளக்கக் கையலையும்' நட்சத்திரக் கையலையும் அமைச்சுச் சில விளக்கக் கையலையும்.
• கனவீரையம், வலுவரும் படிப்புத்தகம் தமிழியம் தொட்டிக லாகம் திருத்தக் கையலையும் அமைச்சுச் சில விளக்கக் கையலையும்.
• மாணவரும் தொட்டிக லாகம், பாதகத்தகம் தம்பரா பாதகத்தகம்.
• தொட்டிக லாகம் மாணவரும் தம்பரா பாதகத்தகம் தமிழியம் தொட்டிக லாகம் திருத்தக் கையலையும் அமைச்சுச் சில விளக்கக் கையலையும்

சான்றகம்பாதுகாபுரத்திட்டமும்

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பஞ்சார்க்கழகம்

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
20LSU101  

B.Sc Physics  

(For I-UG Science Degree Classes)  

அல்லு – 1 : கல்வின் திறக்கம் எழுத்து – 1  
(10மறுதொசக்)  

சுருக்கக் கல்வியடைந்து, நுண்ண நுண்ணயிலிங்கப்-பார்ப் தாக்கவும் - சாமுகச் சிறப்பு விளம்போன்று காட்டுகைக் கல்வியடைந்து காம்பு-பார்ப் தாக்கவும்  
காண்கள் - சிறுகுழு, தேர்ப்பொழுது-தொலைக்காட்சிப் பகுதி - பரிசானிக்கும் - பிற ஹஸ் அறிவியல் சிறப்பு - தொலைக்காட்சிப் பகுதி - காப்பியங்கள் - காப்பியங்கள் காற்று உடலின் தொலைக்காட்சிகள் - காப்பியங்கள் - காப்பியங்கள் தொலைக்காட்சிகள் காற்று உடலின் தொலைக்காட்சிகள் - காப்பியங்கள் - காப்பியங்கள் தொலைக்காட்சிகள்.  

அல்லு – II: கல்வின் திறக்கம்  
(12மறுதொசக்)  

அறிச்சொல்லும்  
சிறுகுழு: மாதங்கள் மாதங்கள் - சிறுகுழு - காலக்காட்சியும் - 140  
சிறுகுழு: மாதங்கள் மாதங்கள் - சிறுகுழு - காலக்காட்சியும் - 110  
சிறுகுழு: மாதங்கள் மாதங்கள் - சிறுகுழு - காலக்காட்சியும் - 6  
பதிகுப்புக்கக்கள்: சிறுகுழு - பதிகு - 27  
பதிகுப்புக்கக்கள்: போஸ்ட்குட்டு பதிகு - பதிகு - போஸ்ட்குட்டு பதிகு - பதிகு -  
பல்போச்ட்குட்டு பதிகு - பதிகு - 6, பல்போச்ட்குட்டு பதிகு - பதிகு - 7, பல்போச்ட்குட்டு பதிகு - பதிகு - 9, பல்போச்ட்குட்டு பதிகு - பதிகு - 10, பல்போச்ட்குட்டு பதிகு - பதிகு - 11.  
சிறுகுழு: மாதங்கள் மாதங்கள் - காலக்காட்சியும் - 9  
சிறுகுழு: மாதங்கள் மாதங்கள் - காலக்காட்சியும் - 110  
சிறுகுழு: மாதங்கள் மாதங்கள் - காலக்காட்சியும் - 192  
சிறுகுழு: மாதங்கள் மாதங்கள் - காலக்காட்சியும் - 1-70  

அல்லு – III: அறிகள்குழு (10மறுதொசக்)  
1. சிறுகுழு: சிறுகுழு - சிறுகுழு - மாதங்கள் மாதங்கள் - மாதங்கள்  
சிறுகுழு: சிறுகுழு - மாதங்கள் மாதங்கள் - மாதங்கள் - மாதங்கள் -  
சிறுகுழு: சிறுகுழு - மாதங்கள் மாதங்கள் - மாதங்கள் - 20 மாதங்கள்.  
2. பிறகு கருவிக பிறகு கருவிக கருவிக கருவிக 5 மாதங்கள்  
கருவிக கருவிக கருவிக கருவிக கருவிக  
3. மாதங்கள் மாதங்கள் - மாதங்கள் மாதங்கள் (1-50 மாதங்கள்)  
அறிச்சொல் பிறகு பிறகு - பிறகு பிறகு - பிறகு பிறகு - பிறகு பிறகு  
4. சிறுகுழு: சிறுகுழு - சிறுகுழு - (5 மாதங்கள்)  
சிறுகுழு: சிறுகுழு - சிறுகுழு - சிறுகுழு - சிறுகுழு - சிறுகுழு -
அலகு - IV: கண்பெரும இலக்கியம் (10மணிநிலை)
(அ). லிங்கப்பிசாரம்

மங்கலவாழ்த்துப் பாடல்: (21-29) - பெரும் தியானா-கன்னராலி கலப்பாடல் பாடியுள்ளார்.

புதுக்காளத் காலக், (48-56) - பிரமர் கலக்கோண்-பக்தர் பார்வூத்தி.

முதல் மாணவன்: (5-34) - பாரவ்வூத்தி - பிரபல் பிரமர் பிரிவுகள்

நிதிக் காலக்: (207-234) - அரைக்கய் வாழ்த்துப் பாடல்

வாழ்த்துக்காளத்: (9) - பலகைகள் உருவநிலை - பிரமர் விளக்கப்பணி

(அ). மலர்மீனவன்

பால்பதிகு ஏகாடானை: பாத்திரம் படுத்துக் காலத்:
'பவதிச் பிளாம்' - 'பமுக்கலியபர்', 'அரைக்கயக்கலியபர்' - 'தோன்று கல்லூர்'

சிறுகைரளம் அரங்கமாட்சியகச் காலத்: பாவல் பிரமரிக்க காணல் பட்டாண்டகம்

'கண்டன் தேவசான் பாத்திரம் மலர்மீனவன் - அருவிக்கல் காண் நத்தாள்' (73-98).

சிறுகைரளம் அரங்கமாட்சியகச் காலத்திற்கு விளக்கப்பணி

அலகு - V: அத்திருச்சாள் பலகைச்சாள் இலக்கியம் - I
(8மணிநிலை)

சிறுகை, வசதி, பால்பதிகு ஏகாடானை
(அ). பதில் பாவல் எதன் பாத்திரம்- பெரும், தியானா, இலக்கன் நாகரக அருவி, சுத்தக்கல் பால்கண்டம் பார்வூத்தி காண்டல் புறநிலை பார்வூத்தி

(அ). குறுக்கிழிக்க

1. கையினுடைய துணைப்படு தொடர் தொட்டு நிலையமல்லை
2. பயிர்கைகளை பல்கைகளின் தொட்டு தொட்டு பெரும் தியானா நிலையமல்லை
3. குறுகிழிக்க பானைக்கற விளக்கப் பதை
4. பயிர்கைகளை தூக்குகைகள் கூட்டுமில்லை வாழ்த்து, பாவல் ப்பார்வூத்தி நிலையமல்லை
5. கையினுடைய தொடர் தொட்டு நிலையமல்லை
6. பமுக்கலியபர் அருவிக்கல் தொடர் தொட்டு
7. பமுக்கலியபர் அருவிக்கல் பாத்திரம்
8. சிறுகை பதில் பாத்திரமாட்சியகச் காலத்திற்கு விளக்கப் பதை.
Instruction Hours / week: L: 4 T: 0 P: 0  Marks: Internal: 40  External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective:
- To train students to acquire proficiency in English by reading different genres of literature and learning grammar.
- To provide aesthetic pleasure through literature.

Course Outcome:
- Retrieve fundaments of the English language to construct error free sentences
- Establish and maintain social relationships
- Develop communication skills in a business environment
- Refine communication competency through LSRW skills
- Improving intrapersonal skills through literary works

UNIT - I: Grammar

Types of Sentences, Subject and Predicate, Parts of Speech and Articles

UNIT –II: Interpersonal Skills

Greetings&Introduction- Giving&Denying Permission- Telephone Etiquette- Oral Presentation – Plan, PowerPoint Presentation- Preparation of Speech- Audience psychology- Secrets of Good Delivery

UNIT - III: Communication Exercise

Importance of Business Language- Words often Confused- Words often Misspelt- Common Errors in English-Charts and Pictorial Writing.

UNIT - IV: LSRW Skills

Listening- Listening and its types, Basic Listening Lessons
Speaking- Basics of speaking, Regular English, Business English, Interview English
Reading- Reading and its purposes, Types of Reading, Reading Techniques
Writing- Types of Writing, Components of Writing, Language and Style with accordance to the contexts

UNIT - V: Literature

Prose: Let’s Do What India Needs from Us - Dr. A.P.J. Abdul Kalam
Poem: A Prayer for My Daughter - W.B. Yeats
Short Story: Sparrows - K. Ahmad Abbas

SUGGESTED READINGS:

Course Objectives

- To know how to use Newton’s laws of motion
- To solve advanced problems involving the dynamic motion of mechanical systems and other advanced mathematics in the solution of the problems.
- To find the use of conservation of energy and linear and angular momentum
- To solve dynamics problems.

Course Outcomes (COs)

Students understand:

1. Parameters defining the motion of mechanical systems and their degrees of freedom.
2. Study the interaction of forces between solids in mechanical systems.
3. Application of the vector theorems of mechanics and interpretation of their results.
4. Introduction to analytical mechanics as a systematic tool for problem solving.

UNIT I- LAWS OF MOTION


UNIT II-GRAVITATION

Newton’s Law of Gravitation. Experimental determination of the gravitation constant (G) Gravitational field- Gravitational potential-potential energy-velocity of escape from the earth-velocity of escape from the solar system-Gravitational potential field due to a spherical shell-Gravitational potential field due to a solid sphere- Gravitational potential field due to a circular disc-Superposition principle- gravitational self energy of a body- gravitational self energy of a uniform solid sphere.
UNIT III - OSCILLATIONS
Friction-Static Friction - Laws of Friction-Angle and cone of Friction - Motion up and down on a rough inclined plane.

UNIT IV - MOTION OF RIGID BODY
Moment of inertia of a rod, disc, spherical shell, solid and hollow spheres - Theory of compound pendulum and Kater’s pendulum - Determination of ‘g’ - Derivation of expressions for angular momentum and kinetic energy of a system of N particles.

UNIT V - ELEMENTS OF SATELLITE MOTION
Expression for orbital velocity, time period and escape velocity of a satellite. Expression for closed and open orbits, Geo-stationary satellite, Weightlessness, artificial Gravity in space station.

SUGGESTED READINGS
1. Mechanics by Mathur D.S. and P S Hemne, 2014, S. Chand & Co., New Delhi,
8. https://nptel.ac.in/courses/122104014/
Course Objectives

- Gives a brief introduction about the different physical properties of matter which are relevant to daily life applications, like elasticity, surface tension, viscosity etc.
- To give an introduction about the different properties of matter, and their different states.

Course Outcomes (COs)

1. Understanding the fundamental laws and principles of different areas of physics.
2. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.

UNIT I - Conservation Laws


UNIT II- ELASTICITY

Introduction to Volumetric, longitudinal, bulk stress and strain - Hooke’s law- Stress-strain diagram - Elastic moduli-Relation between elastic constants- Poisson’s Ratio-Expression for Poisson’s ratio in terms of elastic constants- Work done in stretching & work done in twisting a wire- Twisting couple on a cylinder- Determination of Rigidity modulus by static torsion-Torsional pendulum-Determination of Rigidity modulus and moment of inertia - q, η& by Searles method.

UNIT III- BENDING OF BEAMS

Cantilever - Expression for bending moment - Expression for depression - Cantilever oscillations - Expression for time period - Experiment to find Young's modulus - Non uniform
bending - Experiment to determine Young's modulus by Koenig's method - Uniform bending - Expression for elevation - Experiment to determine Young's modulus using microscope.

UNIT IV - SURFACE TENSION
Surface tension and Surface energy- Pressure difference across a spherical surface- Pressure difference across a curved surface - Angle of contact - Angle of contact for water in a glass - Vapour pressure over a flat and curved surface - Variation of Surface tension with temperature - Jaeger’s method - Quincke’s method.

UNIT V - VISCOSITY
Streamline flow and Turbulent flow - Stoke’s law - Stoke’s method for the coefficient of viscosity - Poiseuille’s method for the coefficient of viscosity - correction to Poiseuille’s equation - Ostwald’s viscometer - Variation of viscosity with temperature and pressure - Friction and Lubrication - Searle’s viscometer - Viscosity of gases - Modification of Poiseuille’s formula for gases - Rankine’s method for determining the coefficient of viscosity of a gas.

SUGGESTED READINGS
7. https://nptel.ac.in/content/storage2/courses/103105066/Module%20II.pdf
Course Objectives
This course enables the students to learn
- To know the determinant, Eigenvalues and Eigenvectors of a real matrix
- To provide the basic knowledge of Trigonometry and hyperbolic functions.
- To give basic knowledge about Mathematical concepts in Differential calculus.
- The concepts of Integral calculus and evaluation of different types of integrals.
- To solve the ordinary differential equations.

Course Outcomes (COs)
On successful completion of this course, the students will be able to

1. Understanding the concept of Characteristic equations to find Eigen Values and Eigen Vector.
2. Gain knowledge of trigonometric functions and related problems.
3. Achieve the knowledge of calculating higher order derivatives
4. Evaluate definite and indefinite integrals.
5. Apply suitable methods for solving first order and second order differential equations

UNIT I: MATRICES

UNIT II: TRIGONOMETRY
Expansions of \( \sin n\theta \), \( \cos n\theta \) and \( \tan n\theta \) – Expansions of \( \sin^n \theta \), \( \cos^n \theta \) -Expansions of \( \sin \theta \), \( \cos \theta \) and \( \tan \theta \) in terms of \( \theta \) – Hyperbolic and inverse hyperbolic functions and their properties – Logarithm of a complex number – General principal values – problems.

UNIT III: DIFFERENTIAL CALCULUS
The tangent line and the derivative of a function – Numerical differentiation, differentials of higher order derivatives, discontinuities, stationary points, maximum-minimum problems, inflexion points, limiting values of functions: L’Hospital’s rule, combining limits, Calculus of several variables: Functions, change of variables, total differential, chain rule, partial differentiation, Euler’s theorem.

UNIT- IV: INTEGRAL CALCULUS
Integration, odd-even functions, indefinite integrals, standard integrals, methods of integration (by part, substitution, partial fractions and other) Reduction formula.
UNIT V: ORDINARY DIFFERENTIAL EQUATIONS

Higher order Linear differential equations with constant coefficients – Method of variation of parameters – Simultaneous first order linear differential equations with constant coefficients.

SUGGESTED READINGS

7. https://youtu.be/N-Ejf2jCwn4
8. https://www.youtube.com/watch?v=F2NqTTej98Q
SEMESTER – I

B.Sc Physics

20PHU111

MECHANICS PRACTICAL

3H – 2C

Instruction Hours / week: L: 0 T: 0 P: 2

Marks: Internal: 40  External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective

1. To impart knowledge on various types of Mechanisms and instruments.
2. To impart skills to analyze the position, velocity and acceleration.

Course Outcomes (COs)

Students can

1. Understand and analyze basic theory and principles of forces in mechanics and their relationship to engineering applications.
2. Analyze motion, forces and motion, work and energy problems and their relationship to engineering applications.

ANY SIX EXPERIMENTS

1. Measurements of internal & external diameter of the given object using vernier caliper and Measuring the thickness of the given objects using screw gauge
2. To determine the Height of a Building using a Sextant.
3. To determine g by Kater’s Pendulum
4. Experimental verification of lami’s theorem
5. To Find the Weight of a Given Body Using Parallelogram Law of forces.
6. To determine the co-efficient of friction between the slider and the inclined plane.
7. To determine g by compound pendulum
8. To study the Motion of a Spring and calculate Spring Constant
9. To determine the moment of inertia of a solid sphere
10. To determine g by Bar Pendulum.

SUGGESTED READINGS

1. Engineering Practical Physics, S.Panigrahi & B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
Course Objective

1. To be able to identify solids, liquids and gases, and their main properties.
2. To be able to identify changes of state.
3. To be able to discuss changes of state in terms of the energy of molecules

Course Outcomes (COs)

1. Empower the student to acquire engineering skills and practical knowledge, which help the students in their everyday life
2. The properties of solids especially knowledge of elasticity help the students to identify the materials suitable for the construction of buildings, houses etc.
3. Properties of fluids especially knowledge of viscosity and surface tension help the students in their daily life and agriculture.

ANY SIX EXPERIMENTS

1. To determine the Young's Modulus of the wooden by Optical Lever Method.
2. To determine the Modulus of Rigidity of a Wire by Maxwell’s needle.
3. To determine the Young’s modulus of the bar using pin and microscope – Non-uniform method.
4. To determine the Young’s modulus of the bar using cantilever – Non-uniform method.
5. To determine the surface tension of water – capillary rise method
6. To determine the coefficient of viscosity by Stoke’s method
7. Verification of laws of transverse vibration and frequency of tuning fork – Sonometer
8. Rigidity modulus – Torison pendulum
9. To determine the Young’s modulus of the bar – Koenig’s method
10. To determine the coefficient of viscosity of the liquid – Poiseuille’s method

SUGGESTED READINGS

1. Engineering Practical Physics, S.Panigrahi & B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
Course Objectives
This course enables the students

- To develop skills for quantitative estimation using computer language.
- To code various differentiation and integration methods in a modern computer language.
- To plot the graphs of function.

Course Outcomes (COs)
On successful completion of this course, the student will be able to

- Acquire problem-solving skills through computer programming.
  Plot various functions and parametric curves.

List of Practical

1. Finding addition, multiplication of two matrices.
2. Finding Inverse of a matrix and Determinant of a matrix.
3. Plotting of graphs of function $e^{ax + b}$, $\log(ax + b)$, $1/(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$, $|ax + b|$ and to illustrate the effect of $a$ and $b$ on the graph.
4. Plotting the graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.
5. Evaluating definite integrals.(Line integral)
7. Solution of second order ordinary differential equations with initial conditions.

SUGGESTED READING

**B.Sc Physics**

**SEMESTER – II**

20LSU201  தமிழ் இரண்டாம் தாள்

**Instruction Hours / week: L: 4 T: 0 P: 0**  Marks: Internal: 40  External: 60  Total: 100

End Semester Exam: 3 Hours

**பாடத்திட்டப் பயன்பாடுகள்**

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வளர்ந்து பங்கினை உணர்த்துதல்
- கருத்து வளர்ந்து பங்கினை உணர்த்துதல்
- மைத்தினைப் பக்குவப்படுத்தல்
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு மாற்றும் சின்னங்கள்
- அரசு மதர்வுகளுக்கு மாணவர் ஆயத்தாக்குதல்

**பாடத்திட்டப் பயன்பாடுகளின் விளக்கம்**

- தமிழ் பொறித்துரைகளை வெளிப்படுத்துவதற்கான வகை துறைகளில், முதலிடம் செய்து வெளிப்படுத்துவதற்கான துறைகளில்
- செய்வல் வழி, குறிப்பிட்டு வெளிப்படுத்துவதற்கான துறைகளில்
- தமிழ் பொறியியல் வகைகள்
- தமிழ் பொறியியல் வகைகள்
- தமிழ் பொறியியல் வகைகள்

<table>
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<th>வேலையை அதிகம் செய்துவரும்</th>
<th>மரபுப்புணர் விளக்கங்கள்</th>
<th>முதலாம் வரும் விளக்கங்கள்</th>
<th>முக்கியமான சின்னங்கள்</th>
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அதாவது - I: தமிழ் இலக்கியவரலாறு- II
(10 மாணவிகளுக்கு)

தமிழில்காலத்தை சார்ந்த தமிழ் கல்வி மற்றும் உயிரியல் கல்விகளைக் கொண்டு விளக்கும் முறையில் தமிழ் இலக்கியவரலாறு அறிமுகம். அலகு – I:
தமிழ் இலக்கியவரலாறு

அதாவது - II: இந்து இலக்கியமுறுற்றுக்குறிக்கை
(10 மாணவிகளுக்கு)

1. தொல்லியல் பட்டவகுப்புகளுக்குரியது
2. முழுமையான பட்டவகிளிகள்
3. முழுமையான பட்டவகிளிகள்

அதாவது - III: இத்தாலிக்கியமுறுற்றுக்குறிக்கை
(10 மாணவிகளுக்கு)

1. பானூர் பட்டவக்கள்
2. பானூர் பட்டவக்கள்

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
3. கவிதையிலுள்ள சிபின் மேல்புறம் -
4. கவிதைத்தமிழ் அப்பரிட்டின் மேல்புறம் - பாடத்துணர்
5. சிபின் மேல்புறம் - காலம்.
6. கவிதையிலுள்ள மேல்புறம் -

அலகு – IV: சிறுகளதிலக்கியம் (8 மணிந்திரும
1. மகோமசோனம் - புதுக்கவினத்
2. அப்போவின் நவஷ்டி - பிரபஞ்சன்
3. அப்போவின் அப்போவாவல் - அரு. குருவோல்வி
4. உருசிக்கல்லெடுக்கு - நல்லோரன்

அலகு – V: அம்பலியல் கல்வியியல் மொழியியல்- II (7மணிநிறம்)

நிக்கல் சிபின்: அம்பலியல் கல்வியியல்

மொழியியல் - பிரித்தானியரின் அரசியல் - புதுக்கவினத் - அரசியல் - தமிழ் பவளியியல்

கிபல் சிபின்: பாடம்பாடல்

பத்தோல்வி, புதுக்கவினத், சிபின், காலம், பாடம்பாடல் - காலம் - பாடம்பாடல் - காலம்

மொழியியல் - புதுக்கவினத் - 2.

பவளியியல் - மொழியியல் - 2.

மொழியியல் பாடம்பாடல் - காலம்.

காலம் பாடம்பாடல் - மொழியியல் -

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
SEMESTER – I

20ENU201 ENGLISH -II 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objective:
- To refresh the grammar knowledge of the students to improvise their language.
- To make the students understand different kinds of communication involved in the business environment.
- To help the students develop their listening, speaking, reading and writing skills.
- Introducing literary works to the students to enhance their analytical and aesthetic skills.

Course Outcome:
- Strengthen the foundation of the language to elevate the command of standard grammar.
- Formulate and communicate persuasive arguments for specific business outcome.
- Apply fundamentals of language for reading, writing and effective communication.
- Standardize and demonstrate understanding of LSRW skills.
- Introduce literature to enhance the moral and aesthetic values.

UNIT –I – Grammar
Tenses, Voice, Idioms and Phrases and Clauses

UNIT –II – Business and Technical Reports
Business Correspondence – Memo, Notices, Agenda, Minutes- Resume Writing- Report Writing- Letter Writing- Personal and Social Letters- E-mail Writing

UNIT –III – Communication Practice
Verbal and Non-Verbal Communication- Group Discussion and Seminars- Note-Taking and Note-Making

UNIT –IV – LSRW Skills
Listening Skills- Listening Talks and Presentations
Speaking Skills- Public Speaking- Preparatory steps, Time Management, Handling Questions and Meeting unexpected situations
Reading Skills- Language of Newspapers, Magazines and Internet
Writing Skills- Writing Paragraphs and Essays- Content Writing
UNIT –V –Literature
    
    **Prose**- Morals in the Indian Context by Francis Nicholas Chelliah
    **Poetry**- Telephone Conversation by Wole Soyinka
    **Short Stories**-The Last Leaf by O’ Henry

SUGGESTED READINGS

2. Sound Business, Julian Treasure 2012OUP
Course Objectives

- To establish grounding in electromagnetism in preparation for more advanced courses.
- The major concepts covered are: the abstraction from forces to fields using the examples of the gravitational, electric and magnetic fields, with some applications; the connection between conservative forces and potential energy; how charges move through electric circuits; the close connection between electricity and magnetism, leading to the discovery of electromagnetic waves.

Course Outcomes (COs)

Students can

1. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
2. Use an understanding of calculus along with physical principles to effectively solve problems encountered in everyday life, further study in science, and in the professional world.
3. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.

UNIT I GAUSS THEOREM AND ITS APPLICATIONS

Normal electric induction Gauss theorem, application of guass theorem - Electric intensity at a point immediately adjacent to a charged conductor - Energy stored in unit volume of an electric field.

Capacitance and Capacitors Spherical capacitor: Cylindrical capacitor, Force of attraction between charged plates of a capacitor – capacity of a parallel plate capacitor; effect of introducing a dielectric slab between the plates – Guard ring condenser - polarization in dielectric materials.

UNIT II – INTRODUCTION TO MAGNETOSTATICS

Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. magnetic field B; magnetization M; magnetic field intensity H; magnetic susceptibility and magnetic permeability; magnetic materials and magnetization; magnetic hysteresis - Brief introduction of dia-, para- and ferro-magnetic materials.

UNIT III

THERMO ELECTRICITY: Seebeck effect – Laws of thermo e.m.f – Peltier effect; Peltier Coefficient – determination of Peltier co-efficient – thermo dynamical consideration of Peltier effect – Thomson effect – Thomson Co-efficient – e.m.f generated in a thermocouple taking both Peltier effect and Thomson effect in the metals – Thermo electric power – Application of thermodynamics to Thermocouple – Thermoelectric diagrams and their uses. UNIT IV – INTRODUCTION TO ELECTROMAGNETIC INDUCTION


UNIT V DYNAMICS OF CHARGED PARTICLES

Charged particles in a uniform and constant electric field – Charged particles in an alternating electric field – Charged particles in a uniform and constant magnetic field – magnetic focusing – charged particles in combined electric and magnetic field when the fields are parallel and are in mutually perpendicular direction.

SUGGESTED READINGS

1. Textbook of electricity and magnetism by N Subrahmanyam, Brij Lal, Ratan Prakashan Ltd.
4. Introduction to Electrodynamics by Griffiths D.J. (2013), United States, Benjamin Cummings.
7. https://nptel.ac.in/courses/108104130/
Course Objectives

- The objective of this paper is to give information about different electronic circuits and their applications.
- To understand operation of semiconductor devices.
- To understand DC analysis and AC models of semiconductor devices.
- To understand operation of LED, Photodiode and Solar cell.
- To understand the concept of zero-crossing detector and Level detector.

Course Outcomes (COs)

Students can be able:

1. To apply concepts for the design of Regulators and Amplifiers.
2. To verify the theoretical concepts through laboratory and simulation experiments.
3. To implement mini projects based on concept of electronics circuit concepts.
4. To implement mini projects related to LED and Solar cell.

UNIT I
SEMICONDUCTOR DIODES

Introduction, Semiconductor, Energy band description of semiconductors, Hole current, Intrinsic semiconductor and extrinsic semiconductor, n-type and p-type semiconductor, pn junction, properties of pn junction, Applying D.C voltage across pn junction or biasing a pn junction, Current flow in a forward biased pn junction, Breakdown voltage, Knee voltage. Semiconductor diode, equivalent circuit of crystal diode, Forward current, Peak inverse voltage, Reverse current.

UNIT II
TWO-TERMINAL DEVICES AND THEIR APPLICATIONS

Transistor, Transistor action: Working of npn and pnp transistor, Common emitter connection, Relations between $\alpha$ and $\beta$, Transistor load line analysis, Operating point, Cut off, Saturation and Active region.

UNIT III
AMPLIFIERS


UNIT IV
SINUSOIDAL OSCILLATORS


UNIT V
APPLICATIONS OF OP-AMPS

Inverting and Non-Inverting amplifier, Voltage follower, Multistage OP-Amp circuits, Averaging or Adding amplifier, Subtractor amplifier, OP-Amp Integrators and Differentiators, Square wave generator, Zero-crossing detector, Level detector.

SUGGESTED READINGS


Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
15. https://nptel.ac.in/courses/117107094/
16. https://nptel.ac.in/content/storage2/courses/113106062/Lec13.pdf
Course Objectives
This course enables the students to learn
- To demonstrate vector differential operators to identify solenoidal and irrotational vectors.
- To get the ability of solving Partial differential equations.
- To expand the given function into Fourier series.
- To give basic knowledge in evaluating double and triple integrals.
- Numerical techniques of differentiation and integration.

Course Outcomes (COs)
On successful completion of this course, the students will be able to
1. Analyzing the differential operator to find Gradient, Divergence and Curl.
2. Form and solve partial differential equations of first order
3. Understand the nature of Fourier series that represent even and odd functions.
4. Evaluate line, surface and volume integrals
5. Apply the numerical concepts in solving the differentiation and integration.

UNIT-I: VECTOR CALCULUS

UNIT II: PARTIAL DIFFERENTIAL EQUATIONS
Formation of partial differential equations by elimination of arbitrary constants and functions - Definitions of general, particular and complete solutions - solving standard forms f(p, q) = 0, f(x,p,q) = 0, f(y,p,q) = 0, f(z, p, q) = 0, f(x,p) = f(y,q), z = px +qy + f(p,q) - Lagrange’s Differential equations Pp+Qq = R.

UNIT III: FOURIER SERIES
Dirichlet’s Conditions – Definition of Fourier series – Finding Fourier Coefficients for a given periodic function 2π with interval (0,2π) and (-π, π) – Odd Functions – Even functions – Half Range Sine Series – Half Range Cosine series – Harmonic Analysis.

UNIT IV: MULTIPLE INTEGRAL
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates – Triple integration in Cartesian coordinates – Area as double integral – Volume as triple integral.
UNIT V: NUMERICAL METHODS

SUGGESTED READINGS
8. https://www.youtube.com/watch?v=ma1QmE1SH3I
10. https://www.youtube.com/watch?v=aqu6v4ydfd4
11. https://www.youtube.com/watch?v=UKHBWzoOKsY
Semester – II

20PHU211 ELECTRICITY AND MAGNETISM PRACTICAL

Marks: Internal: 40  External: 60  Total: 100
End Semester Exam: 3 Hours

Course Objectives
- To establish grounding in electromagnetism in preparation for more advanced courses.
- Assess the contributions of physics to our evolving understanding of global change and sustainability while placing the development of physics in its historical and cultural context.

Course Outcomes (COs)

Students can
- Gain knowledge and develop skills in the basic concept of electric forces.
- Understand Gauss law and its applications.

Any Six Experiments

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.
2. To determine Self Inductance of a Coil by Rayleigh’s Method.
3. To compare capacitances using De’Sauty’s bridge.
5. To study the Characteristics of a Series RC Circuit.
6. To study a series LCR circuit and determine its (a) Resonant Frequency,
7. To determine a Low Resistance by Carey Foster’s Bridge.
8. TAN A – Determination of magnetic moment of the bar magnet
9. TAN B – Determination of magnetic moment of the bar magnet
10. Measurement of charge and current sensitivity of Ballistic galvanometer
11. Calibration of low range voltmeter - Potentiometer
SUGGESTED READINGS


2. Engineering practical Physics, S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd.

Course Objectives

- The objective of this paper is to give information about different analog electronic circuits and their applications.
- To understand operation of semiconductor devices.

Course Outcomes (COs)

1. Acquire a basic knowledge in solid state electronics including diodes, MOSFET, BJT, and operational amplifier.
2. Develop the ability to analyze and design analog electronic circuits using discrete components.

Any 6 experiments

1. To study V-I characteristics of PN junction diode.
2. To study the V-I characteristics of a Zener diode.
3. Study of V-I & power curves of solar cells, and find maximum power point & efficiency.
4. To study the characteristics of a Bipolar Junction Transistor in CE configuration.
5. To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias.
6. To study the frequency response of voltage gain of a RC-coupled transistor amplifier.
7. To design a phase shift oscillator of given specifications using BJT.
8. To design an inverting amplifier using Op-amp (741,351) for dc voltage of given gain
9. To design inverting amplifier using Op-amp (741,351) and study its frequency response
10. To design non-inverting amplifier using Op-amp (741,351) & study its frequency response
SUGGESTED READINGS
Course Objectives

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.

Course Outcomes (COs)

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners.

Unit I – INTRODUCTION - ENVIRONMENTAL STUDIES & ECOSYSTEMS

Environment Definition, Scope and importance; Ecosystem, Structure and functions of ecosystem. Energy flow, Food chains and food webs, Ecological succession. Classification of ecosystem. Forest ecosystem, Grassland Ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit II - NATURAL RESOURCES - RENEWABLE AND NON-RENEWABLE RESOURCES

Natural resources - Renewable and Non – Renewable resources. Land resources and land use change, Land degradation, soil erosion and desertification. Forest resources - Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water resources - Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water. Use of alternate energy sources, growing energy needs,
case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**Unit III - BIODIVERSITY AND ITS CONSERVATION**

**Unit IV - ENVIRONMENTAL POLLUTION**

**Unit V - SOCIAL ISSUES AND THE ENVIRONMENT**

**SUGGESTED READINGS**
Course Objective

The aim and objective of the course:

- This course builds the ideas of harmonic motion to cover in depth concept of waves in physics with particular emphasis on light waves as an example.
- The foundation of the course is Fourier theory, which will then be used to understand dispersion of waves, image formation in optics and diffraction and other aspects of Fourier optics.

Course Outcome

On completion of the course, the student should be able to:

- Account for fundamental quantities for waves and optics.
- Identify, illustrate and explain physical concepts in waves and optics.
- Describe and discuss technical applications of simple optical instruments.
- Solve problems using suitable models, assumptions and approximations as well as be able to assess the results.
- Plan and conduct simple experiments and give an oral and a written presentation of the results.

UNIT I


UNIT II

INTERFERENCE: Introduction to Interference -Young’s double slit experiment –theory and experiment of Fresnel’s Bi-prism - Coherent sources and their production - Conditions for observing interference constructive and destructive interference – Calculation of thickness of the Coherent sources by division of amplitude - Interference in thin films - reflected and transmitted light - Theory of air wedge -Newton’s Rings: Measurement of wavelength and
refractive index - Determination of Refractive index of a liquid.

Unit - III

**Diffraction:** Introduction to Fresnel and Fraunhoffer diffraction - Fresnel diffraction Concept of Fresnel’s half period zones - Theory of rectilinear propagation - Construction and working of Zone plate - Comparison of Zone plate with lens - Theory of diffraction due to a straightedge - Fraunhoffer diffraction theory at a single slit - Theory of plane diffraction grating - Discussion of Dispersive power of grating –Applications of Resolving power - Expression for resolving power of prism, grating and telescope.

UNIT IV

**Polarization:** Introduction to Polarization and types of polarized light –production methods – Brewster’s law - Huygens’ explanation of double refraction -Theory of superposition of two plane polarized waves with perpendicular vibrations- Theory of retarding plates - Quarter wave plates and Half wave plates - Production of linearly, elliptically and circularly polarized light - Detection of linearly, elliptically and circularly polarized light Optical activity - Fresnel's explanation, Laurent's half shade polarimeter.

UNIT-V

**Applications of Optics:** The Electro-optic effect - Applications of Pockel effect and Kerr effect - Acousto-optic effect - Magneto optic effect.

**Fiber Optics:** Total internal reflection – modes of propagation of light in optical fibers – evaluation of numerical aperture and acceptance angle - types of optical fibers– fiber optical communication system (block diagram).

**SUGGESTED READINGS**

7. [https://nptel.ac.in/courses/122107035/](https://nptel.ac.in/courses/122107035/)
Course Objective

- To know about power semiconductor devices frequently used in industries.
- To have an idea about the principle and operation of circuits using semiconductor devices to control various operations.
- To acquaint with industrial and domestic applications of power semiconductor devices.

Course outcomes

students can able to:

1. Understand the construction and working of different semiconductor devices.
2. Develop knowledge on design trade-offs in various digital electronic families with a view towards reduced power consumption.
3. Design power electronic circuit for real time application like rectifier and convertor etc.

UNIT I ELECTRICITY:


UNIT II CAPACITORS and INDUCTORS

Capacitors:


UNIT III

circuits, parallel circuits and series parallel circuits - Voltage divider; Current divider; Concept of voltage source and current source - Voltage source in series and current source in parallel - Simple problems in DC circuits.

UNIT IV


UNIT V


SUGGESTED READINGS

Course Objective

- Understand the various forms of conventional energy resources.
- Learn the present energy scenario and the need for energy conservation
- Explain the concept of various forms of renewable energy
- Outline division aspects and utilization of renewable energy sources for both domestic and industrial application

Course Outcome

student can able to:

1. Describe the environmental aspects of non-conventional energy resources. In comparison with various conventional energy systems, their prospects and limitations.
2. Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc.
3. Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
4. Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications.

UNIT - I

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, solar energy.

UNIT- II

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning.
UNIT -III


Ocean Energy: Ocean Energy Potential against Wind and Solar

UNIT - IV


UNIT - V


SUGGESTED READINGS

8. https://nptel.ac.in/courses/112105051/
9. https://nptel.ac.in/content/storage2/courses/121106014/Week8/lecture24.pdf
Course Objectives:
The objective of this course is to enable the students to familiar and experience with various mechanical and electrical tools through hands-on mode.

Course outcome
Students can
1. Acquire knowledge about various types of wiring systems, wiring tools, lighting & wiring accessories, wiring estimation & costing, etc.
2. Acquire knowledge about household electrical appliances, electric shock, etc.
3. To get familiarized with the properties of different materials - metals and non-metals

UNIT - I
Introduction: Measuring units. conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.

UNIT - II

UNIT- III

UNIT - IV

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
UNIT - V

Introduction to prime movers: Mechanism, gear system, wheel, Fixing of gears with motor axel. Lever mechanism, Lifting of heavy weight using lever. braking systems, pulleys, working principle of power generation systems. Demonstration of pulley experiment.

SUGGESTED READINGS

Course Objectives
The student should know

1. The molecular orbital theory, preparation and properties of inorganic compounds.
2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.
3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
4. Elements of photochemistry, chemical kinetics and chromatography.
5. About the dyes, chemotherapy and vitamins.

Course Outcome
The student understand

1. The molecular orbital theory, preparation and properties of inorganic compounds.
2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.
3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
4. Elements of photochemistry, chemical kinetics and chromatography.
5. About the dyes, chemotherapy and vitamins.

UNIT-I

UNIT- II
Covalent Bond and Stereoisomerism: Covalent Bond: Orbital overlap, hybridization and geometry of CH₄, C₂H₄ and C₂H₂. Polar effects: Inductive effect-electromeric effect-mesomeric effect- steric effect- hyperconjugation. Stereoisomerism: Elements of symmetry-
polarised light and optical activity-isomerism in tartaric acid-racemisation- resolution- geometrical isomerism of maleic and fumaric acids-keto-enol tautomerism of acetoacetic esters.

UNIT-III

UNIT-IV

UNIT- V
Dyes, Chemotherapy and Vitamins: Dyes: Terms used chromophore, auxochrome, bathachromatic shift and hypsochromic shift- classification of dyes– based on chemical structure and application-one example each for azo, triphenylmethane, vat and mordant dyes-preparation.
Chemotherapy: Preparation, uses and mechanism of action sulpha drugs- preparation and uses of prontosil, sulphadiazine and sulphafurazole-structure and uses of pencillins and Chloromycetin. Vitamins: Diseases caused by the deficiency of vitamins A, B\textsubscript{1}, B\textsubscript{2}, C and D-sources of these vitamins.

SUGGESTED READINGS


Course Objective
The aim of the course is to make them to
➢ Understand the resolving power of different optical instruments.
➢ Understand and working of polarimeter.

Course Outcomes
On successful completion of this course students will:
1. Gain knowledge on various theories of light.
2. Acquire skills to identify and apply formulas of optics and wave physics.
3. Understand the properties of light like reflection, refraction, interference, and diffraction etc.,
4. Understand the applications of diffraction and polarization.

Any 8 Experiments
1. Spectrometer – Determination of the angle of the prism and refractive index of the prism.
2. Spectrometer – To draw the i-d curve for a given prism and hence to calculate the refractive index of the material.
3. Spectrometer – Determination of wavelength of spectral lines of mercury
4. Spectrometer – Determine the dispersive power and resolving power of the material of the given prism.
6. Spectrometer – Determination of wavelength of spectral lines of Na atomes by using grating
7. Determine the specific rotation of Sugar, Glucose using polarimeter.
8. To determine wavelength of sodium light using Newton’s Rings.
10. Determine the thickness of the given wire using air wedge method
11. To determine the wavelength of Laser light using Diffraction grating.
12. Fraunhoffer diffraction at single slit using He-Ne laser.
13. To determine wavelength of sodium light using Fresnel Biprism.
14. Determine the thickness of the given wire by diffraction pattern using He-Ne laser.
15. Verification of Malus law using half and quarter wave plate.

**SUGGESTED READINGS**

Course Objective

- To know about semiconductor devices frequently used in industries.
- To acquaint industrial and domestic applications of semiconductor devices.

Course Objective

The course as a whole outlines some ways of thinking about analog circuits that hopefully will help to develop intuition.

1. By the end of this subject, students should have acquired reasonable proficiency in the analysis and design of basic electronic circuits.
2. Apply the concepts of basic electronic devices to design various circuits.
3. Understand operation of diodes, transistors in order to design basic circuits.
4. Design small and large signal amplifier circuits for various practical applications.
5. Design, fabricate and test small electronic circuit.

Any 6 Experiments

1. To design a power supply using bridge rectifier and study effect of C-filter.
2. To design the active Low pass and High pass filters of given specification.
3. To design the active filter (wide band pass and band reject) of given specification.
4. To study the output and transfer characteristics of a JFET.
5. To design a common source JFET Amplifier and study its frequency response.
6. To design an Amplitude Modulator using Transistor.
7. To design an Astable multivibrator of given specifications using IC 555.
8. To study the zero-crossing detector and comparator
9. To design a digital to analog converter (DAC) of given specifications.
10. To study the analog to digital convertor (ADC) IC.
11. To investigate the use of an op-amp as a Differentiator and Integrator.
SUGGESTED READINGS

Course Objective
To describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.

Course Outcome
Students can able to
1. Demonstrate training modules on solar energy, wind energy, etc.
2. Convert units of energy to quantify energy demands and make comparisons among energy uses, resources, and technologies.
3. Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.

Any 5 Experiments
1. Solar cell characteristics
2. Solar water heater.
4. Analysis of wind velocity
5. Analysis of solar radiation for a day
7. Study of box type solar cooker.

SUGGESTED READINGS
Instruction Hours / week: L: 0 T: 0 P: 3  Marks: Internal: 40  External: 60  Total: 100

End semester Exam: 3 Hours

Course Objectives

- To understand concepts of various basic equipments and devices.
- To gain a knowledge and to understand fundamental physical concepts.

Course Outcomes

Students can

- Develop skills in assessing the quality of one's own and others' work
- Develop skills in observation, interpretation, reasoning, synthesis, generalizing, predicting, and questioning as a way to learn new knowledge.

Any 4 Experiments

1. Screw guage, Vernier Calipers, Spherometer, Least count, Zero error, Measurement of thickness of the scale, breadth of scale, radius of curvature of a concave and convex surface.
4. Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB.

SUGGESTED READINGS

Course Objective
To make the student able to identify the elements and the functional groups present in an organic compound.

Course Outcome
On successful completion of the course the students should have

1. Learnt about the qualitative analysis of organic compounds.
2. Learnt the detection of elements and functional groups present in an organic compound by systematic analysis.

Systematic analysis of an organic compound
➢ Preliminary tests
➢ Detection of elements present
➢ Aromatic or aliphatic
➢ Saturated or unsaturated
➢ Nature of the functional group,
➢ Confirmatory tests– aldehydes, ketones, amines, amides, diamide, carbohydrates, phenols, acids, esters & nitro compounds.

Note: Each student should analyse minimum 6 compounds.

References:
Course Objectives

- This is an introductory course to the basic concepts in thermodynamics and statistical Mechanics. We mainly study idealized thermal system under equilibrium.
- It serves as the foundation for more advanced courses on the subjects. The course is divided in two main parts.
- In the first part we will examine the basic laws of thermodynamics with focus on first and second laws with application to thermodynamic processes.
- In the second part of the course we will focus on the Gibbs ensemble formulation of equilibrium and use various statistical mechanics to obtain in the different ensembles thermodynamic energies, potentials and other important statistical quantities. The main emphasis of the course is theoretical.

Course Outcomes (COs)

Students can understand

- describe and apply the physical concepts work, heat, inner energy, temperature, thermodynamic observables and entropy, .
- describe thermodynamic systems and states and apply the laws of thermodynamics,
- use experimental methods to investigate thermodynamic relations and present the results,
- do calculations on phase transitions,
- analyse heat processes theoretically and determine their degree of efficiency, perform calculations on heat conduction and heat radiation in various geometries

UNIT - I

Laws of Thermodynamics:

temperature scale - Clausius inequality - concept of Entropy. Third law of thermodynamics.

UNIT - II
Thermodynamic Potentials:
Enthalpy – Gibbs - Helmholtz and Internal Energy functions - Equilibria and stability - Maxwell’s relations and applications - Joule-Thompson Effect - Maxwell construction - Gibbs Phase Rule - Clausius- Clapeyron Equation - Expression for \( C_p - C_v \) and \( C_p/C_v \)-the TdS equations -Cooling due to adiabatic demagnetization.

UNIT - III
Kinetic Theory of Gases:

UNIT - IV
Basic Statistical Mechanics:

UNIT – V
Statistical Mechanics with thermodynamics:
SUGGESTED READINGS

6. An Introduction to Thermodynamics and Statistical Physics, By Piero Olla, 2015, Springer International Publisher, Switzerland, ISBN-978-3-319-06187-0.
8. https://nptel.ac.in/courses/112105123/
10. https://nptel.ac.in/courses/115106111/
Course Objective

The objective of the course is to introduce students the fundamentals of atomic physics and rudimentary nuclear physics. It aims to provide a coherent and concise coverage of traditional atomic and nuclear physics.

Course Outcome

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

1. Acquire knowledge and understanding about the electronic and nuclear structure of atoms.
2. Have an appreciation of the influence of atomic and nuclear physics on modern scientific development.
3. Have the foundations for examining in more detail various aspects of experimental and theoretical physics which relate to both atomic and nuclear physics.
4. Explain the key areas in which Atomic and Nuclear Physics affects everyday living.

UNIT-I

UNIT-II

UNIT- III
General Properties of Nuclei: History, basic terminology, Intrinsic properties, quantitative facts about size, shape, mass, charge density (matter energy), Nuclear force, binding energy, main features of binding energy versus mass number curve

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of various terms, Fermi gas model, evidence for nuclear shell structure, nuclear magic
numbers, Collective model.

UNIT - IV

**Nuclear Reactors:** Nuclear fission - Energy released in fission - Bohr and Wheeler’s theory of nuclear fission - Chain reaction - Multiplication factor - Natural uranium and chain reaction - Design of nuclear reactor - Breeder reactor - Nuclear fusion - Source of stellar energy - Thermonuclear reactions - Transuranic elements.

Ionization chamber – Geiger-Muller counter – Proportional counter – Wilson’s cloud chamber – Bubble chamber.

UNIT- V

**Particle physics:** Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model.

**SUGGESTED READINGS**

9. [https://shodhganga.inflibnet.ac.in/jspui/bitstream/10603/58059/11/11_chapter%201.pdf](https://shodhganga.inflibnet.ac.in/jspui/bitstream/10603/58059/11/11_chapter%201.pdf)
10. [https://shodhganga.inflibnet.ac.in/bitstream/10603/67853/8/08_chapter%201.pdf](https://shodhganga.inflibnet.ac.in/bitstream/10603/67853/8/08_chapter%201.pdf)
11. [https://shodhganga.inflibnet.ac.in/bitstream/10603/157179/8/08_chapter%205.pdf](https://shodhganga.inflibnet.ac.in/bitstream/10603/157179/8/08_chapter%205.pdf)
12. [https://nptel.ac.in/courses/115101003/](https://nptel.ac.in/courses/115101003/)
13. [https://nptel.ac.in/courses/115103101/](https://nptel.ac.in/courses/115103101/)
Course Objectives

- This course is to get exposure with various aspects of instruments and their usage through hands-on mode.
- To impart physical measurement skills.
- To make the students understand coherence between theoretical and practical measurement.

Course Outcome

Students can:

1. Develop skills to impart practical knowledge in real time solutions.
2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
3. Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.
4. Understand measurement technology, usage of new instruments and real time applications in engineering studies.

UNIT-I


UNIT- II

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.

AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier-amplifier. Block diagram ac millivoltmeter, specifications and their significance.

UNIT- III

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only – no mathematical treatment),
brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance.

UNIT- IV
CRO Measurement: Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

UNIT- V
Impedance Bridges & Q-Meters: Block diagram of bridge. working principles of basic(balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges.


Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution.

SUGGESTED READINGS
9. https://nptel.ac.in/courses/108105153/
Course Objective

The aim of this course is to give awareness regarding radiation hazards and safety.

- To identify the parts of the x-ray machine and explain their purpose and function.
- Explain how x-rays are produced and how they travel.
- Compare the effects that x-radiation has on a variety of biological and non-biological materials.

Course Outcomes

Students can be able to:

1. List and describe the function the parts of the x-ray machine
2. Describe the spectrum of electromagnetic radiation.
3. Impact knowledge on different radiation detector.

UNIT - I

**Basics of Atomic and Nuclear Physics:** Basic concept of atomic structure; X rays characteristic and production; concept of bremsstrahlung and auger electron, The composition of nucleus and its properties, mass number, isotopes of element, spin, binding energy, stable and unstable isotopes, law of radioactive decay, Mean life and half life, basic concept of alpha, beta and gamma decay, concept of cross section and kinematics of nuclear reactions, types of nuclear reaction, Fusion, fission.

UNIT - II


**Interaction of Neutrons** - Collision, slowing down and Moderation.

UNIT - III

**Radiation detection and monitoring devices: Radiation Quantities and Units:** Basic idea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose, effective
dose, collective equivalent dose, Annual Limit of Intake (ALI) and derived Air Concentration (DAC).

UNIT - IV

Radiation detection: Basic concept and working principle of gas detectors (Ionization Chambers, Proportional Counter, Multi-Wire Proportional Counters (MWPC) and Gieger Muller Counter), Scintillation Detectors (Inorganic and Organic Scintillators), Solid States Detectors and Neutron Detectors, Thermoluminescent Dosimetry.

UNIT - V


SUGGESTED READINGS

2. G.F.Knoll, Radiation detection and measurements
3. Thermoluminescence Dosimetry, Mcknlay, A.F., Bristol, Adam Hilger (Medical Physics Handbook 5)
4. G.F.Knoll (2010), Radiation detection and measurements, John Wiley & Sons
9. [https://nptel.ac.in/content/storage2/courses/112101007/downloads/Lecturenotes/Lecture37.pdf](https://nptel.ac.in/content/storage2/courses/112101007/downloads/Lecturenotes/Lecture37.pdf)
Course Objectives

1. To make the student to be conversant with the extraction of metals, coordination chemistry, preparation, properties uses and structure of naphthalene and heterocyclic compounds.

2. To make the student acquire sound knowledge of electrochemistry, biological functions of amino acids and proteins, thermodynamic laws, entropy, enthalpy change and the principles of electroplating.

Course Outcome

1. The student understand the metallurgy of metals and the theories of coordination compounds and the industrial importance of EDTA, haemoglobin and chlorophyll.

2. Understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.

3. Understand the preparation, classifications and properties of amino acids, proteins and carbohydrates.

4. Understand the concepts of first and second laws of thermodynamics.

5. Understand the fundamentals of electrochemistry.

Unit-I


Unit-II

Aromatic Compounds and Heterocyclic Compounds:


Unit-III

Amino acids, Proteins and Carbohydrates: Amino acids: Classification, preparation and properties. Peptides-preparation of peptides (Bergmann method only). Proteins: Classification, properties, biological functions and structure. Carbohydrates: Classification,
preparation and properties of glucose and fructose- discussion of open chain and ring structures of glucose and fructose-glucose-fructose interconversion.

Unit-IV

Unit-V

SUGGESTED READINGS
Course Objectives
The objective of this course is to learn how to apply thermodynamic principles in order to interpret thermodynamic systems and predict their behaviors.

Course Outcome
On successful completion of this course students will:

1. Understand the process of thermal conductivity, viscosity and diffusion in gases
2. Able to correlate theory and practicals.
3. Apply the laws of thermodynamics to real physical systems and processes.
4. Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.

Any 7 Experiments
1. To determine the coefficient of thermal conductivity of a bad conductor by Lee’s disc method.
2. Verification of Newton’s law of cooling.
3. Determination of thermal conductivity of rubber.
4. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
5. Cooling Curve of a metallic body.
6. To determine the temperature co-efficient of resistance of the given thermistor using post-office box.
7. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system
8. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge
9. Coefficient of thermal conductivity of copper by Searle’s method
10. Thermal conductivity of copper by angstrom method.
11. To determine the specific heat capacity of liquid by Joule’s Calorimetre.
SUGGESTED READINGS


SEMESTER IV

20PHU412 ATOMIC AND NUCLEAR PHYSICS PRACTICAL 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End semester Exam: 3 Hours

Course Objectives
- The aim of the course is to make them to understand general properties of Nucleus.
- To study the nuclear forces and nuclear reactions.
- To understand basic concept of radiation principles.

Course Outcomes
- At the end of the course, the students can able to
- Acquire basic knowledge about nuclear and particle physics
- Develop the nuclear reactions and neutron physics.
- To introduce the concept of elementary particles

Any 5 Experiments

1. G.M.Counter-Absorption co-efficient and inverse square law.
2. Measurement of counts of radiation by radioactive source using GM counter
3. ‘e/m’ by Magnetron method.
4. ‘e/m’ by Thomson method
5. ‘e/m’ by Millikan oil drop method.
6. Absorption spectra of Iodine
7. Atomic transition of Copper using Arc spectrum
8. Rydberg constant by Hydrogen gas spectrum.
10. Absorption spectrum of Alkali earth metal - Stark effect

SUGGESTED READINGS

Course Objectives:

- To familiarize the students with working, design and analysis of basic amplifier circuits.
- To design and analyze wave shaping circuits, rectifiers and power supply circuits
- Introduce the basic concept of qualitative and quantitative analysis of an instruments.
- Study the concept of separation science and its applications.

Course Outcomes:
The students will be able to
1. Handle any kind of process by framing it in block diagram, mathematical model and different process variables.
2. Use modern engineering tools and techniques in the practice of electronic devices.
3. Know all the industrial processes and demonstrate their knowledge in designing the control loops for these processes.
4. Understand the working of various types of amplifiers, oscillators, wave shaping and power supply circuits
5. Design and Analyze the various types of amplifiers, oscillators, wave shaping and power supply circuits for any practical situation.
6. Discuss the terms, principle, instrumentation, operation and applications of instruments.

The test of lab skills will be of the following test items:
1. Calibration of a low range voltmeter-potentiometer.
2. Full wave rectifier
3. Calibration of an ammeter-potentiometer
4. Half wave rectifier
5. Measurement of unknown frequency using lissajous figures by CRO.
6. Measurement of risetime and falltime using CRO.
7. Study the layout of receiver circuit.
8. Trouble shooting a circuit
9. Balancing of bridges
Laboratory Exercises:
1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure $Q$ of a coil and its dependence on frequency, using a $Q$- meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/ frequency counter.
6. Measurement of rise, fall and delay times using a CRO.

Open Ended Experiments:
1. Using a Dual Trace Oscilloscope
2. Converting the range of a given measuring instrument (voltmeter, ammeter)

SUGGESTED READINGS
2. Performance and design of AC machines - M G Say ELBS Edn.
8. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India
Course Objectives:
- This course is aimed to cover the basic radiation principle.
- nuclear interactions with matter and detection.
- biological effects of radiation and measurement.
- shielding of nuclear radiation.

Course Outcomes:
- At the completion of course, student would be able to understand the concepts of nuclear radiation.
- know the interaction of nuclear radiation with matter.
- detect the nuclear radiation.
- be familiar with dosimeters and measurements.

Any 4 Experiments
1. Study the background radiation levels using Radiation meter
2. Study of characteristics of GM tube and determination of operating voltage and plateau length using background radiation as source (without commercial source).
4. Study of radiation in various materials (e.g. KSO4 etc.). Investigation of possible radiation in different routine materials by operating GM at operating voltage.
6. Detection of α particles using reference source & determining its half life using spark counter
7. Gamma spectrum of Gas Light mantle (Source of Thorium)

SUGGESTED READINGS
2. G.F. Knoll, Radiation detection and measurements
3. Thermoluminescence Dosimetry, Mcknlay, A.F., Bristol, Adam Hilger (Medical Physics Handbook 5)
4. W.J. Meredith and J.B. Massey, “Fundamental Physics of Radiology”. John Wright and
Course Objective

The student on successful completion of the course should learn the principles of volumetric analysis and to estimate the compounds by acidimetry, alkalimetry and permanganometry.

Course Outcome

1. The student learnt the principles of quantitative analysis of inorganic compounds.
2. Learnt the estimation of sample present in a solution by volumetric analysis.

Volumetric analysis

A. Acidimetry & Alkalimetry

1. Estimation of sodium carbonate using standard sodium hydroxide.
2. Estimation of sodium hydroxide using standard sodium carbonate.
3. Estimation of sulphuric acid using standard oxalic acid.
4. Estimation of potassium permanganate using standard sodium hydroxide.

B. Permanganometry

1. Estimation of ferrous sulphate using standard Mohr’s salt.
2. Estimation of oxalic acid using standard ferrous sulphate.

SUGGESTED READINGS

Course Objectives

- To provide students with a repertoire of mathematical methods that are essential to the solution of advanced problems encountered in the fields of applied physics and engineering.
- In addition, intended to prepare the student with mathematical tools and techniques that are required in advanced courses offered in the applied physics.

Course Outcomes (COs)

They can be able to write program for mathematical problems.

1. To communicate mathematical and physical knowledge and ideas to the students.
2. To apply his/her knowledge and skills to carry out advanced tasks and projects.
3. To contribute innovations and application of basic research.

UNIT I - BASIC OF C LANGUAGE
Introduction, Data types, Operators and Expressions, Conditional Statements, Input and output Statements (Programs)

UNIT II - COMPLEX ANALYSIS:

UNIT III - VECTOR CALCULUS
UNIT IV

INTEGRAL CALCULUS: Definite and Indefinite integrals – Methods of Integration – Integration by substitution – Integration by parts.

UNIT V - SPECIAL FUNCTIONS

SUGGESTED READINGS
9. Mathematical Physics by Pavan Kumar Chaurasya, 2013, Campus Books International Publisher.
11. https://nptel.ac.in/courses/106/104/106104128/
12. https://nptel.ac.in/courses/111105123/
13. https://nptel.ac.in/content/storage2/courses/112104158/lecture8.pdf
Course Objective

The aim and objective of the course:

The aim of this course is to provide the students with the fundamental principles of electrical energy (electro-magnetism). It is very important to understand the propagation of waves in different media, its transmission and reception.

Course Outcome

Students can

1. Solve Maxwell’s equations using vector calculus in three standard coordinate systems
2. calculate electric and magnetic fields from stationary and dynamic charge and current distributions.
3. solve simple electrostatic boundary problems.
4. describe simple models for electromagnetic interaction with media
5. be able to choose adequate models and solution methods for specific problems

UNIT - I


UNIT - II

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media.

UNIT - III

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law.

UNIT - IV

Propagation of Electromagnetic Waves: Electromagnetic waves in Free space - Isotropic dielectric - Anisotropic dielectric – Conducting media - Ionized gases. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law, Reflection & Transmission

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore-641021, India
coefficients, Total internal reflection.

UNIT -V

Wave Guides: Planar optical wave guides, Planar dielectric wave guide, Condition of continuity at interface, Phase shift on total reflection, Phase and group velocity of guided waves, Field energy and Power transmission.

SUGGESTED READINGS

11. https://nptel.ac.in/courses/108104130/
Course Objective

- Identify the circumstances, discoveries and people that launched Modern Physics.
  Enumerate and understand the postulate of relativity.
- Learn about the speed of light as a natural limit to speed.
- Explain the problem of simultaneity and calculate time changes from one frame of reference to another.
- Describe relativistic length contraction and mass-energy relation.
- Explain the work of Planck, Bohr, Heisenberg, uncertainty principle and the other features of Quantum Mechanics.

Course Outcome

Students can
1. recall and apply knowledge in the areas of optics and waves, special relativity and quantum physics (developing the knowledge capability dimension);
2. analyse and solve problems in these areas (developing the critical analysis and problem solving capability dimension);
3. conduct relevant experiments, analyse data and report results in written form (developing the technical capability and communication dimensions).

UNIT-I: RELATIVITY

Invvariance of physical laws, constancy of speed of light, relativity of simultaneity, the Lorentz transformation, length contraction, time dilation, the Doppler effect, relativistic motion, relativistic momentum, relativistic energy, the Galilean transformation and Newtonian mechanics as non-relativistic limits.

UNIT-II

Wave-particle duality: Electromagnetic Waves - photoelectric effect, x-ray production, X-ray diffraction, Compton scattering, uncertainty principle, electron waves, nuclear atom and atomic spectra, energy levels and the Bohr model of the atom, lasers, and continuous spectra.

UNIT- III: QUANTUM MECHANICS

Wave function, Wave Equation - the one-dimensional Schrödinger equation, Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities
and normalization; Probability and probability current densities in one dimension. Particle in a onedimensional box, potential wells, potentials barriers and tunneling, the harmonic oscillator.

**UNIT-IV**


**UNIT- V**

**Radioactivity:** stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.

**SUGGESTED READINGS**

SEMESTER V

20PHU504B MICROPROCESSOR AND MICROCONTROLLER 3H – 3C

Instruction Hours / week: L: 4 T: 0 P: 0  Marks: Internal: 40  External: 60  Total: 100

End Semester Exam: 3 Hours

Course Objective

- To understand the Architecture of 8085 and 8086 microprocessor.
- To learn the design aspects of I/O and Memory Interfacing circuits.
- To interface microprocessors with supporting chips.
- To study the Architecture of 8051 microcontroller.
- To design a microcontroller based system

Course Outcome:

At the end of the course, the students should be able to:

- Understand and execute programs based on 8086 microprocessor.
- Design Memory Interfacing circuits.
- Design and interface I/O circuits.
- Design and implement 8051 microcontroller based systems.

UNIT I: 8085 MICROPROCESSOR

Introduction to microprocessor – Basic components of a microcomputer – I/O devices – Memory – ROM – RAM – Architecture of 8085 – Address bus – Data bus – Control bus – Pin configuration – Registers Arithmetic and logic unit – Flags – Instruction format – Types of instructions – Addressing modes – Assembly language programming – Programmes for addition, subtraction, biggest and smallest from the given list.

UNIT II: THE 8086 MICROPROCESSOR

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

UNIT III: 8086 SYSTEM BUS STRUCTURE

Introduction to advanced processors.

UNIT IV: MICROCONTROLLER
Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V: INTERFACING MICROCONTROLLER
Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

SUGGESTED READINGS:

8. https://nptel.ac.in/courses/108/105/108105102/
9. https://nptel.ac.in/courses/117/104/117104072/
Course Objective

- This paper is aimed at giving idea to the students regarding the nature of human body, usage of different radiations for the treatment of body etc.
- To introduce the student to a number of applications of physics to medicine with particular emphasis on those commonly used in the work of the medical physicist.

Course Outcome

At the end of the course, students can

1. Define medical imaging techniques specified in the syllabus below and know where they are applied in clinical practice.
2. Describe how ionising radiation interacts with matter, how it affects living organisms and how it is used as a therapeutic technique.

UNIT – I

PHYSICS OF THE BODY-I


UNIT – II

PHYSICS OF THE BODY-II

Acoustics of the body: Nature and characteristics of sound, Production of speech, Physics of the ear, Diagnostics with sound and ultrasound. Optical system of the body: Physics of the eye. Electrical system of the body: Physics of the nervous system, Electrical signals and information transfer.

UNIT - III

PHYSICS OF DIAGNOSTIC AND THERAPEUTIC SYSTEMS-I

X-RAYS:
Electromagnetic spectrum, production of x-rays, x-ray spectra, Brehmsstrahlung,

UNIT - IV

RADIATION PHYSICS: Radiation units exposure, absorbed dose, units: rad, gray, relative biological effectiveness, effective dose- Rem & Sievert, inverse square law. Interaction of radiation with matter Compton& photoelectric effect, linear attenuation coefficient. Radiation Detectors: ionization (Thimble chamber, condenser chamber), chamber. Geiger Muller counter, Scintillation counters and Solid State detectors, TFT.

UNIT - V

MEDICAL IMAGING PHYSICS: Evolution of Medical Imaging, X-ray diagnostics and imaging, Physics of nuclear magnetic resonance (NMR), NMR imaging, MRI Radiological imaging, Ultrasound imaging, Physics of Doppler with applications and modes, Vascular Doppler. Radiography: Filters, grids, cassette, X-ray film, film processing, fluoroscopy. Computed tomography scanner - principle and function, display, generations, mammography. Thyroid uptake system and Gamma camera (Only Principle, function and display)

SUGGESTED READINGS

Course Objectives

1. The aim of this practical is to use the computational methods to solve physical problems.
2. To communicate mathematical and physical knowledge and ideas to the students through computer programming.
3. To aware the students about the computer knowledge and modelling of mathematic functions.
4. To demonstrate the utility and limitations of a variety of powerful calculational techniques and to provide a deeper understanding of the mathematics underpinning theoretical physics.

Course Outcomes (COs)

Students will have understanding of:
- Understand matrix and partial differential equations.
- Understand complex analysis.
- Understand the integral transforms.
- Understand basics of linear transformations and tensors.
- Understand calculations of special functions.
- Students will learn the importance of computer programming.

ANY 8 EXPERIMENTS

1. Evaluate the Beta and Gamma function using C program.
2. Write the C Program to Print Square of Each Element of 2D Matrix.
3. Calculate the addition and subtraction of 2 matrices.
4. Write the C Program to Add two Complex Numbers.
5. Write C functions to add and multiply two complex numbers.
6. Program to find Transpose of Given Square Matrix.
7. Evaluate Subtraction of two matrices in C.
8. Write the C Program to perform complex number multiplication.
9. Write the C program to calculate sum of Upper Triangular Elements.
10. Write the C Program to Check whether entered matrix is magic square or not?
11. Find Inverse of a 3 X 3 Matrix using C program.
12. Write C Program to Compute Cross Product of Two Vectors.
14. Check if a Number is Positive or Negative Using if...else.
16. Write a C Program to find the Factorial of a Number.

SUGGESTED READINGS

4. An Introduction to computational Physics, T.Pang, 2nd Edn., 2006, Cambridge Univ. Press
Course Objective

The aim and objective of the course:

The aim of this course is to provide the students by correlating the fundamental principles of electrical energy (electro-magnetism) practically.

Course Outcome

Students can

1. find electric and magnetic fields from stationary and dynamic charge and current distributions.
2. describe simple models for electromagnetic interaction with media
3. be able to choose adequate models and solution methods for specific problems

Any 8 experiments

1. To determine the specific rotation of sugar solution using Polarimeter.
2. To analyze elliptically polarized Light by using a Babinet’s compensator.
3. Determination of wavelength of the monochromatic source using Young’s double slit method.
4. To study the polarization of light by reflection and determine the polarizing angle for air-glass interface.
5. To verify the Stefan’s law of radiation and to determine Stefan’s constant.
6. To determine the Boltzmann constant using V-I characteristics of PN junction diode.
7. To verify the law of Malus for plane polarized light.
8. To study the polarization of light by reflection and determine the polarizing angle for air-glass interface.
9. Charging and discharging of a capacitor
10. Verification of Faraday’s law of electromagnetism
11. Determination of Planck’s constant
SUGGESTED READINGS


2. A Text Book of practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal

Course Objective

- To identify the circumstances, in Modern Physics. Enumerate and understand the postulate of relativity.
- To Learn about the speed of light as a natural limit to speed.
- To understand the work of Planck, Bohr, Heisenberg, uncertainty principle and the other features of Quantum Mechanics.

Course Outcome

Students can

1. recall and apply knowledge in the areas of optics and waves, special relativity and quantum physics (developing the knowledge capability dimension);
2. conduct relevant experiments, analyse data and report results in written form (developing the technical capability and communication dimensions).

Any 8 Experiments

1. Measurement of Planck’s constant using black body radiation and photo-detector
2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine the Planck’s constant using LEDs of at least 4 different colours.
4. I-V characteristics of LED
5. I-V characteristics of photocell
6. Plank’s constant using color filters.
7. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
8. To setup the Millikan oil drop apparatus and determine the charge of an electron.
9. To show the tunneling effect in tunnel diode using I-V characteristics.
10. To determine the wavelength of laser source using diffraction of single slit.
11. To determine the wavelength of laser source using diffraction of double slits.
12. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating
SUGGESTED READINGS

1. Advanced practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal
COURSE OBJECTIVES:

- To Introduce ALP concepts, features and Coding methods
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors

COURSE OUTCOMES:

At the end of the course, the student should be able to:

- Write ALP Programmes for fixed and Floating Point and Arithmetic operations
- Interface different I/Os with processor
- Generate waveforms using Microprocessors
- Execute Programs in 8051

Any 6 experiments

1. 8-bit addition and 8-bit subtraction using 8085 microprocessor.
2. 8-bit multiplication and Division using 8085 microprocessor.
3. Conversion from decimal to hexadecimal system using 8085 microprocessor.
4. Conversion from hexadecimal to decimal system using 8085 microprocessor.
5. 16-bit addition using 8085 microprocessor.
7. To find sum of series
8. To find the sum of first $n$ natural numbers
9. To find the factorial of a number
10. To find the square root of the number.

SUGGESTED READINGS

Course Objective

- This paper is aimed at giving idea to the students regarding the nature of human body and usage of different radiations for the treatment of body.

Course Outcomes

Students can understand:

1. Different areas of research in Medical Physics
2. Understand and apply key concepts specific to energy deposition for both ionizing photon interactions and transport in matter and for energetic charged particle interactions and transport in matter.

Any 6 experiments

1) Understanding the working of a manual Hg Blood Pressure monitor and measure the Blood Pressure.
2) Understanding the working of a manual optical eye-testing machine and to learn eye-testing procedure.
3) Correction of Myopia (short sightedness) using a combination of lenses on an optical bench/breadboard.
4) Correction of Hypermetropia/Hyperopia (long sightedness) using a combination of lenses on an optical bench/breadboard.
5) To learn working of Thermoluminescent dosimeter (TLD) badges and measure the background radiation.
6) Familiarization with Geiger-Muller (GM) Counter and to measure background radiation.
7) Familiarization with Radiation meter and to measure background radiation.
8) Familiarization with the Use of a Vascular Doppler.

SUGGESTED READINGS

2. Christensen’s Physics of Diagnostic Radiology: Curry, Dowdey and Murry - Lippincot Williams and Wilkins (1990)

4. The essential physics of Medical Imaging: Bushberg, Seibert, Leidholdt and Boone

5. Handbook of Physics in Diagnostic Imaging: Roshan S. Livingstone: B. I.
   Publications Pvt Ltd.
Course Learning Objectives

- To know how to impose constraints on a system in order to simplify the methods to be used in solving physics problems.
- To know what central, conservative and central-conservative forces mathematically understand the conservative theorems of energy, linear momentum and angular momentum.
- To know the importance of concepts such as generalized coordinates and constrained motion.
- To establish that Kepler’s laws are just consequences of Newton’s laws of gravitation and that of motion.
- The main objective of this course is to make students aware about the basic formulations in quantum mechanics. There are many different types of representations of state and operators that are very useful in studying the subject deeply.

Course Learning Outcome

2. Students learn about motion of a particle under central force field.
3. Students will be able to appreciate the beauty of quantum mechanics.
4. Students will know all types of representations of operators and ways to apply them in different problems.

Unit I: Lagrangian and Hamiltonian Dynamics


Unit –II: The Two body Central Force Problem

Conservative central forces-Classification of Orbits- The Virial Theorem- The Kepler problem; Inverse Square law of Forces-Rutherford scatterings -Scattering in a central force field
Unit-III: Particle properties of waves
    Planck’s blackbody radiation - de Broglie waves – photoelectric effect – Compton Effect
    - Wave properties of particles: particle diffraction – Davison and Germer experiment –
    Heisenberg’s uncertainty principle - wave packet - phase and group velocities.

Unit – IV: Operator and Postulates of Quantum Mechanics
    The wave function – probability density – probability stream (current) density - dynamical
    operators – linear and hermitian operators – commuting and non-commuting operators –
    Hamiltonian – angular momentum operators-The Schrodinger’s wave equation – time
    dependent form – linearity and superposition – Schrodinger equation: steady state form -
    eigenvalues and eigenfunctions.

Unit – V: Exactly solvable problems
    Free states: Particle in a box – step potential – barrier potential – quantum tunnelling – square
    states – normalized wave functions – expectation values - Harmonic oscillator – energy
    eigenvalues and eigen functions – zero point energy.

SUGGESTED READINGS
    1) Concept of Modern Physics by Arthur Baiser, Shobi tMahajan, S.Rai Choudhury, 6th
    3) A Text Book of Quantum Mechanics by P.M.Mathews & K.Vengatesan, Tata
    6) https://nptel.ac.in/courses/115105098/
    7) https://nptel.ac.in/courses/122106034/
Course Objective:

- This course integrates theory of Solid State Physics with experimental demonstrations in the Physics Lab.
- The course will provide a valuable theoretical introduction and an overview of the fundamental applications of the physics of solids.
- It includes theoretical description of crystal and electronic structure, lattice dynamics, and optical properties of different materials (metals, semiconductors, dielectrics, magnetic materials and superconductors), based on the classical and quantum physics principles.

Course Outcomes

Students should gain basic knowledge of solid state physics. This implies that the student will:

1. be able to account for interatomic forces and bonds.
2. have a basic knowledge of crystal systems and spatial symmetries.
3. be able to account for how crystalline materials are studied using diffraction, including concepts like form factor, structure factor, and scattering amplitude.
4. know what phonons are, and be able to perform estimates of their dispersive and thermal properties.
5. be able to calculate thermal and electrical properties in the free-electron model.
6. be able to outline the importance of solid state physics in the modern society.

Unit I - CRYSTAL STRUCTURE


Unit II - ELEMENTARY LATTICE DYNAMICS

Unit III MAGNETIC PROPERTIES OF MATTER

Unit IV- SUPERCONDUCTIVITY

Unit V - ELEMENTARY BAND THEORY

SUGGESTED READINGS
1. Introduction to solid state physics by C. Kittel, Kittel's, 2019, John Wiley.
9. https://nptel.ac.in/courses/115101012/
Course Objective:

- This course covers the different classes of nanomaterials that have been developed in recent years in light of various technological applications.
- In order to understand the behavior of these nanomaterials, quantum phenomena and the limitations of basic physical laws that are important at the nanometer length scale are introduced and developed.
- In particular, properties that exhibit size effects (including electronic, magnetic, photonic, and mechanical) at the nanometer length scale will be presented so that nanomaterials becoming increasingly relevant to modern technologies can be better understood.

Course Outcome

Students can

- Explain the fundamental principles of nanotechnology and their application to biomedical engineering.
- Apply engineering and physics concepts to the nano-scale and non-continuum domain.
- Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the research literature.
- Design processing conditions to engineer functional nanomaterials.

UNIT - I


Introduction to Nanostructures: Carbon Nanotubes (CNT) - Graphenes- Fullerenes- Nano Peapods- Quantum Dots -Semiconductor Nanoparticles- Metal-based Nanostructures - Nanowires - Nanostructures including dendrimers

UNIT – II

Properties and Size dependence of properties: Chemical -Optical- vibrational- thermal - Electrical -Magnetic -Mechanical -Theoretical Aspects
UNIT-III
SYNTHESIS OF NANOSTRUCTURE MATERIALS
Chemical routes- Electrochemical methods -Vapor growth- Thin films methods: chemical vapor deposition, physical vapor deposition (sputtering, laser ablation), Langmuir-Blodgett growth
Mechanical methods: ball milling, mechanical attrition -Sol-gel methods Special nanomaterials: carbon nanotubes, fullerenes, nanowires, porous silicon- Bio-inspired synthesis -Nanocomposite fabrication -Nanolithography

UNIT - IV

UNIT – V
APPLICATIONS: Nano-electronics -Nano optics -Nanoscale chemical- and bio-sensing - Biological/bio-medical applications- Photovoltaic, fuel cells, batteries and energy-related applications -High strength nanocomposites Nanoenergetic materials

SUGGESTED READINGS
2. C.P.Poole, Jr. Frank J.Owens, Introduction to Nanotechnology, Wiley India Pvt. Ltd.
9. https://nptel.ac.in/courses/118102003/
10. https://nptel.ac.in/courses/118104008/
Course Objectives:

- The course aims to provide students with a foundation in the basic concepts of Biophysics.
- Topics will include canonical and non-canonical structures of nucleic acids, structure of proteins, enzymes etc.
- Fundamental concepts that underlie biomolecular interactions will be discussed and biophysical methods that are employed for the structural analysis of these systems will be introduced at an elementary level.

Course Outcome

1. Demonstrate knowledge of the fundamental concepts in physics and chemistry that underlie biological processes.
2. Define the structural characteristics of nucleic acids and proteins and examine parameters that variously determine their stability and function(s).
3. Describe the principles that govern biomolecular interactions and appreciate how established methods of research and enquiry are employed to analyze the different aspects of these interactions.

UNIT - I


UNIT - II

Molecules of life: Metabolites, proteins and nucleic acids. Their sizes, types and roles in structures and processes. Transport, energy storage, membrane formation, catalysis, replication, transcription, translation, signaling. Typical populations of molecules of various types present in cells, their rates of production and turnover. Energy required to make a bacterial cell. Simplified mathematical models of transcription and translation, small genetic circuits and signaling pathways. Random walks and applications to biology. Mathematical
models to be studied analytically and computationally.

UNIT -III


UNIT -IV


UNIT -V

At the level of an ecosystem and the biosphere: Foodwebs. Feedback cycles and self-sustaining ecosystems.


SUGGESTED READINGS

1. Physics in Molecular Biology; Kim Sneppen & Giovanni Zocchi (CUP 2005)
5. Evolution; M. Ridley (Blackwell Publishers, 2009, 3rd edition)
6. https://nptel.ac.in/courses/122103039/
Course Learning Objectives

• To know what central, conservative and central-conservative forces mathematically understand the conservative theorems of energy, linear momentum and angular momentum practically

• To know the importance of concepts such as generalized coordinates and constrained motion.

Course Learning Outcome

• Students learn about motion of a particle under central force field.

• Students will know all types of representations of operators and ways to apply them in different problems.

Any 8 experiments

1. To determine the coupling coefficient of coupled pendulums.
2. To determine the coupling coefficient of coupled oscillators.
3. To determine the coupling and damping coefficient of damped coupled oscillator.
4. To study population models e.g. exponential growth and decay, logistic growth, species competition, predator-prey dynamics, simple genetic circuits.
5. To study rate equations for chemical reactions e.g. auto catalysis, bistability.
6. To study examples from game theory.
7. Computational visualization of trajectories in the Sinai Billiard.
11. Computational visualization of fractal formations of Fractals in nature – trees, coastlines, earthquakes.

Suggested Readings

3. An Introduction to Fluid Dynamics, G.K.Batchelor, Cambridge Univ. Press, 2002
Course Objectives:

- The course is to understand the basic knowledge on magnetic properties of materials.
- To understand the various parameters of the Hysteresis loop
- Acquire the knowledge of semiconducting and dielectric materials.
- To comprehend the concepts of superconductivity and magnetic properties of solids.

Course Outcome:

- At the end of this course, students will be able to
- Basic practical knowledge on magnetic materials.
- Understand the basic idea about the dielectric Properties of Solids
- Experience the behavior of Hysteresis loop of a crystal

ANY SIX EXPERIMENTS

1. Measurement of susceptibility - Quinck`s Tube Method – Ferromagnetic solution
2. Measurement of susceptibility - Quinck`s Tube Method – Paramagnetic solution
5. Determination of Dielectric constant – Four probe method
6. Study of Hall effect
7. Study seeback’s effect
8. To determine the refractive index of a dielectric layer using SPR technique.
9. To study the PE Hysteresis loop of a Ferroelectric Crystal.
10. To draw the BH curve of iron using a Solenoid and determine the energy loss from Hysteresis.
11. To measure the resistivity of a semiconductor (Ge) crystal with temperature (up to 150°C) by four-probe method and to determine its band gap.
12. To determine the Hall coefficient of a semiconductor sample.
SUGGESTED READINGS

Course Objective

- To provide knowledge of the Nanoscience and related fields.
- To make the students acquire an understanding the Nanoscience and Applications
- To help them understand in broad outline of Nanoscience and Nanotechnology.

Course Outcome

After Completion students can

1. Understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment
2. Apply their learned knowledge to develop Nanomaterial’s

Any 8 experiments

1. Synthesis of metal nanoparticles by chemical route.
2. Analysis of XRD spectra of a sample
4. Analysis of FTIR spectra of a sample
5. Analysis of UV- VIS of a sample
7. Prepare a thin film of semiconductor.
8. Analysis of Photo Luminescence of a sample
9. Analysis of Zeta- potential of a sample
10. Intensity ratio analysis of Raman Spectra
11. Study the resistivity of the prepared thin film

SUGGESTED READINGS

2. C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.). S.K. Kulkarni,
Course Objective

- The course aims to provide students with a foundation in the basic concepts of Biophysics and its process.

Course Outcome

1. Students will function successfully in the laboratory and use safe laboratory practices.
2. Students will critically evaluate data and design experiments to test hypotheses relevant to the practice of Biochemistry and Biophysics.
3. Students will demonstrate awareness of ethical issues in the practice of science.

Any 7 Experiments

1. Measurement of the skin temperature by thermistor
2. Estimation of relative humidity
3. Continual spectrum of visible light
4. Measurement of concentration in colored solution
5. Measurement of human hair thickness by microscope
6. Blood pressure measurement
7. Estimation of audibility threshold by audiometer
8. Recording and analysis of ECG signals
9. Verification of Beers and Lambert’s Law
10. Absorption spectrum of Blood/Chlorophyll.
11. PH Value of Amino acids.
12. Study of DNA melting

SUGGESTED READINGS

2. Medical Instrumentation - by Khandpur, TMH
3. Laboratory Manuals of Biophysics Instruments - by P.B. Vidyasagar
4. Biophysics -by Vatsala Piramal, Dominant Publisher and Distributors, New Delhi-110002
5. Textbook of Biophysics - by R.N. Roy
Course Objectives
The aim of the B.Sc. project work is to expose the students to preliminaries and methodology of research in Theoretical Physics and Experimental Physics. Students get the opportunity to participate in some ongoing research activity and development of a laboratory experiment.

Course Outcomes (COs)
Students can able to
1. Demonstrate a depth of knowledge of Physics.
2. Complete an independent research project, resulting in research outputs in terms of publications in journals and conference proceedings.
3. Demonstrate knowledge of contemporary issues in their chosen field of research.
4. Demonstrate an ability to present and defend their research work.