SYLLABUS

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS),
SIVAKASI – 626 123.

(Affiliated to Madurai Kamaraj University, Re-accredited with A Grade by NAAC,
College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH)

DEPARTMENT OF PHYSICS

SYLLABUS

2020 AND LATER

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN
(AUTONOMOUS)

(Reaccredited with 'A' Grade by NAAC,
College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH Scheme)
SIVAKASI – 626 123

Affiliated to Madurai Kamaraj University, Madurai

Programme Scheme, Scheme of Examination and Syllabus
(With effect from **June 2020**)

DEPARTMENT OF PHYSICS

UG PROGRAMME

Curriculum Design & Development Cell

7/9/2020	B. Dr. - (B. DEEPA)	CDAU 21/09/20	E. Ponnalar 30/9/2020.
CHAIRPERSON	**DEAN CDDC**	**DEAN ACADEMIC AFFAIRS**	**COE**

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI – 626 123.

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DEPARTMENT OF PHYSICS
B.Sc DEGREE PROGRAMME IN PHYSICS

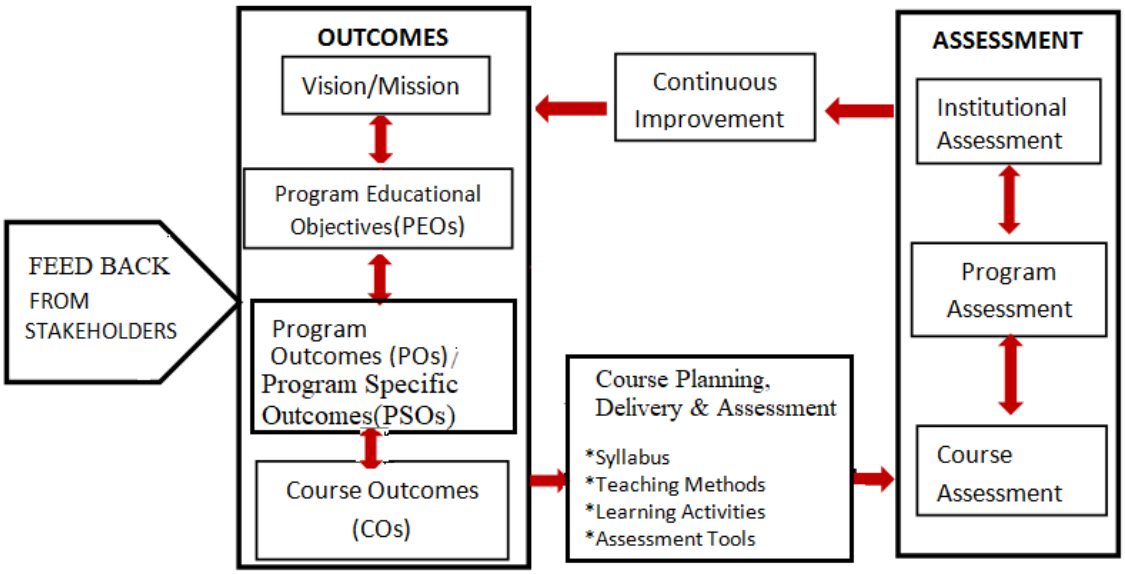
GUIDELINES FOR OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM
(For those who have joined in June 2020 and later)

I. A. PREAMBLE

The institutional vision is to emerge as a premier institution offering need-based, value conscious and career-oriented quality education to empower rural women with communicative competency and employment potential. With the advent of Autonomy in the year 2005, Choice Based Credit System (CBCS) is followed and it offers much flexibility to innovate and design the contents of each programme and align it with the institutional mission. Quality assurance developments in higher education have encouraged us to move towards outcomes-based approach to teaching, learning and assessment. Programme specifications define the students in terms of what they can do at the end of a programme or a particular level of study. This is a change from the more traditional approach where teachers tended to define courses in terms of what is taught, rather than what the student can do at the end of the course or programme. More directed and coherent curriculum, "more relevant" Graduates to industry and other stakeholders and Continuous Quality Improvement (CQI) are the benefits of OBE.

A student-centered paradigm in higher education entails a shift from a more input-oriented curricular design based on the description of course content, to outcomes-based education in which the course content is developed in terms of learning outcomes. The implementation of **Outcome Based Education with CBCS** as per the UGC guidelines from the academic year 2019-2020 will definitely mark a paradigm shift from traditional education.

B. OUTCOME BASED EDUCATION (OBE) FRAMEWORK



C. PROGRAMME EDUCATIONAL OBJECTIVES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Programme Educational Objectives (PEOs):

PEOs are broad statements that describe the career and professional achievements that the programme is preparing the graduates to achieve within the first few years after graduation. PEOs should be consistent with the mission of the Institution. PEO's can be measured by a PO-PEO matrix. The PEO's should evolve through constant feedback from alumnae, students, industry, management etc,. It is mandatory that each PEO should be mapped to atleast one of the POs.

The Graduates will

PEO1: pursue higher studies in related fields including teaching and management and take up careers as educationalist, researcher, technical specialist

PEO2: explore physical systems through theoretical models, experiments and communicate findings of the scientific work with moral responsibility, social concern and eco-consciousness.

PEO3: become self- employed in technical fields and consultancy services.

Programme Outcomes (PO):

Programme Outcomes are narrower statements that describe what students are expected to know and be able to do upon the graduation. These relate to the skills, knowledge and behaviour that students acquire in their study through the programmes.

PO1: Disciplinary knowledge

Apply the knowledge of Arts, Science and Humanities to address fundamental and complex questions appropriate to their programmes.

PO2: Critical thinking, Problem solving and Analytical reasoning

Make use of appropriate knowledge and skills to identify, formulate, analyze and solve problems in order to reach substantiated conclusions.

PO3: Research related skills and scientific reasoning

Critically analyze research processes, products and practices with a view of strategic use of data in their field.

PO4: Communication skills and Digital literacy

Demonstrate skills in oral and written communication and make use of ICT in various learning ambience.

PO5: Team work and Leadership quality

Interact productively with people from diverse backgrounds as both leaders/mentors and team members with integrity and professionalism.

PO6: Multicultural competence with Moral and ethical awareness

Defend the society against gender and environmental issues with moral and ethical awareness.

PO7: Self-directed and Life-long learning

Formulate their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

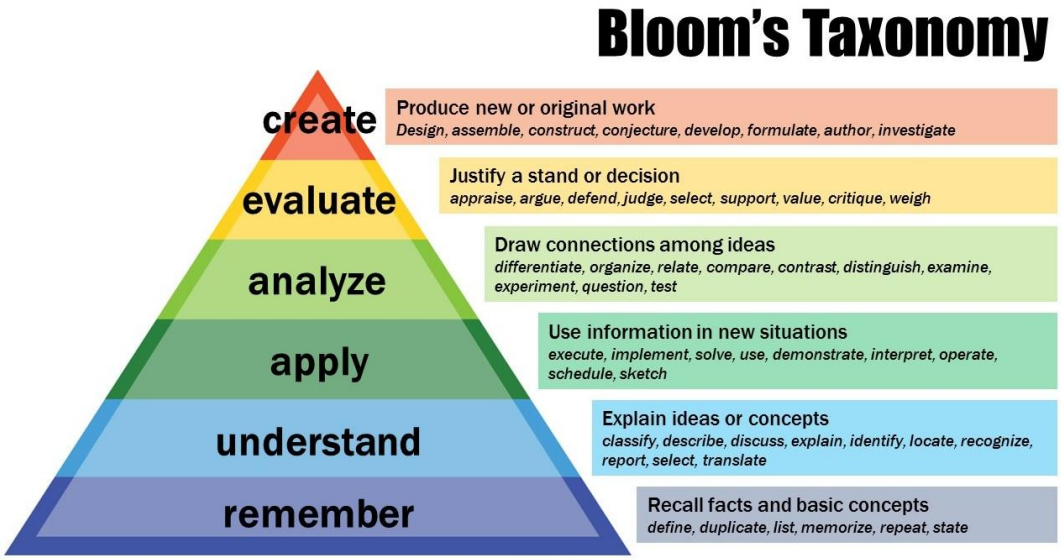
Programme Specific Outcomes (PSO):

Programme Specific Outcomes denote what the students should be able to do at the time of graduation. They are programme specific. It is mandatory that each PO should be mapped to the respective PSO specified in the programme in order.
By the completion of the B.Sc Physics programme, the learners will be able to

PSO1: elucidate and demonstrate the fundamental principles and concepts of physics which include optics, mechanism, electricity, electromagnetism, thermodynamics, digital electronics, wave mechanics etc.
PSO2: collect, analyze data critically and interpret the results to achieve valid conclusions.
PSO3: explore systematically the physical phenomenon by solving problems and performing projects and justify their report scientifically
PSO4: communicate physics concepts, processes and results both in verbal and written form effectively using ICT tools.
PSO5: plan with team members, execute experiments, investigate the experimental results and prepare the documentation for the findings
PSO6: project the true results of scientific findings and conscientious attempt to describe the physical phenomena accurately, without bias and any hyperbole
PSO7: adapt to changes in technology by means of self-directed and lifelong learning in various fields like biopolymers, thin films, crystal growth, nanotechnology, fuel cell etc.

BLOOM'S TAXONOMY:

Bloom's Taxonomy was created in 1956 by an educational psychologist Dr. Benjamin Bloom in order to promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts. It is most often used when designing educational, training, and learning processes.



The K-levels mentioned in the diagram are usually denoted as [k1] to [k6] respectively from the bottom.

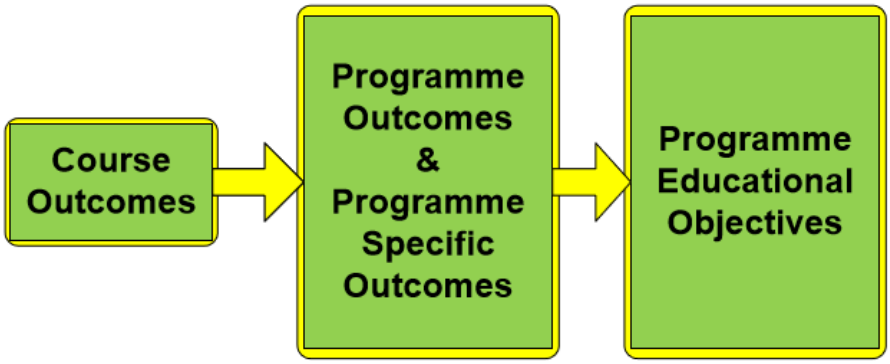
Course Outcomes (CO):

Course Outcomes are narrower statements that describe what students are expected to know and be able to do at the end of each course. These relate to the skills, knowledge, and behaviour that students acquire in their study through the course. Each course comprises five COs and the keywords used to define COs are based on Bloom's Taxonomy [k1] to [k6].

On successful completion of the course, the learners should be able to

CO1: [k1] / [k2]
CO2: [k3]
CO3: [k4]
CO4: [k5]
CO5: [k6]

D. CO-PO &PO-PEO relationship:



E. CO – PO MAPPING OF COURSES:

After CO statements are developed by the course in-charge, COs will be mapped with any possible POs based on the relationship exist between them. A CO must be mapped to atleast one PO. The PO's which are not related to any of the COs in a particular course may be left blank. All the courses together must cover all the POs. The CO-PO matrix for a course is as shown below.

The correlation between COs and PO can be defined by three levels using the Letter Grades H, M, L which denotes respectively High (H), Medium (M), Low (L) and '-' for no correlation.

The concept of Six Sigma is used for calculating weighted percentage of contribution of each course in attainment of respective POs. As per Six Sigma Tool- Cause and Effect Matrix, the weightage of H, M and L are 9, 3 and 1 respectively.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							
Weightage of the course							
Weighted percentage of Course contribution to POs							

The levels of contribution are denoted by Grades and weightages H-High (9), M-Medium (3), L-Low (1)
Weighted percentage of Contribution of the Course in attainment of PO1= Weightage of the course / Total weightage of all courses contributing PO1 computed based on correlation between COs and POs X 100

Programme Articulation Matrix (PAM):

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Total Weightage of all courses contributing to POs								

PO-PEO Mapping Matrix:

PEOs / POs	PEO1	PEO2	PEO3
PO1	X	X	X
PO2	X	X	
PO3	X	X	
PO4	X	X	X
PO5		X	X
PO6	X	X	X
PO7		X	

(Mark X to map a PO to a PEO)

II. ASSESSMENT PROCESS FOR CO ATTAINMENT

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a course.

Assessment tools for CO

Assessment tool	Marks	Description	Conduct of Direct Assessment Tool
Theory Courses- Internal Assessment (40 Marks) (for all courses except Part IV)			
Term Test	25 marks	Three written tests are conducted and average of best two is considered	Term Test I - after the completion of 30 working days Term Test II - after the completion of 55 working days Term test III - after the completion of 80 working days
Assignment	5 marks	Two Assignments for each course and the average of two is considered.	Assignment I- before the commencement of Term Test I Assignment II- before the commencement of Term Test II
Quiz	10 marks	For UG, Three Quizzes are conducted and average of best two is considered	For UG, Quiz must be completed before the commencement of every Term Test
Part-IV Ability Enhancement Courses			
Term Test	25 marks (Converted to 40 marks for Internal Assessment)	Three written tests are conducted and average of best two is considered	Term Test I - after the completion of 30 working days Term Test II - after the completion of 55 working days Term test III - after the completion of 80 working days
Theory Courses- External Assessment (60 Marks)			
End Semester Examination	60 marks	Examination at the end of the course of 03- hour duration.	

Practical Courses - Internal Assessment (50 Marks)		
Observation / Record note book	10 marks	Submission of Observation / Record note book
Skill Based Test	10 marks	Day to day evaluation / Skill Test
Model Practical Examination	30 marks	A Minimum of **TWO** model Exams are conducted for each lab course and the average is considered.
Practical Courses - External Assessment (50 Marks)		
End Semester Practical Examination	50 marks	Examination at the end of the course of 03- hour duration

CO Assessment Rubrics

For the evaluation and assessment of CO's and PO's, rubrics are used.

Internal assessment contributes 60% and End Semester assessment contributes 40% to the total attainment of a CO for the theory courses. For the practical courses, internal assessment contributes 100% of total attainment to a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

CO Attainment:

Direct CO Attainment:

Course outcomes of all courses are assessed and the CO wise marks obtained by all the students are recorded for all the assessment tools mentioned above. The respective CO attainment level is evaluated based on set attainment rubrics.

Attainment Levels of COs

Assessment Methods	Attainment Levels	
Internal Assessment	Level 1	60% of students scoring more than average marks or set target marks in internal assessment tools
	Level 2	70% of students scoring more than average marks or set target marks in internal assessment tools
	Level 3	75% of students scoring more than average marks or set target marks in internal assessment tools
End Semester Examination	Level 1	60% of students scoring more than average marks or set target marks in End Semester Examination
	Level 2	70% of students scoring more than average marks or set target marks in End Semester Examination
	Level 3	75% of students scoring more than average marks or set target marks in End Semester Examination

Target setting for Assessment method:

For setting up the target of internal assessment tools, 50% of the maximum mark is allotted as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

Formula for Attainment for each CO:

Attainment = Percentage of students who have scored more than the target marks

$$\% \text{ of Attainment } = \frac{\text{Number of students who scored more than the target}}{\text{Total number of students}} * 100$$

- Internal Attainment is the average of attainments obtained using various internal assessment tools.
- For Theory Courses,
  Direct CO Attainment = 60% of internal attainment + 40% of End Semester attainment.
- For Practical Courses,
  Direct CO Attainment = 100% of internal attainment.
- For Project,
  Direct CO Attainment = 100% of End semester attainment.

Indirect CO Attainment:

At the end of each course, an exit survey is collected from the students and it gives the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students about the attainment of course outcomes.

Overall CO Attainment = 80% of Direct CO Attainment + 20% of Indirect CO Attainment

In each course, the level of attainment of each CO is compared with the predefined targets, if the target is not reached, the course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the course teacher can set the target as a value greater than the CO attainment of the previous year.

III. ASSESSMENT PROCESS FOR PO ATTAINMENT

Measurement of PO attainment shall be done by direct and indirect methods. Direct assessment method and indirect assessment method are considered for 80% and 20% weightages respectively. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

Direct assessments (rubric based) - Conventional assessment tools such as Term Test, Quiz, Seminar, Assignment and End Semester Examination are used.

Indirect assessments – Done through Course Exit Survey.

The description of Assessment tools used for the evaluation of COs and POs is given below.

Mode of Assessment	Assessment Tool	Description	Evaluation of Course Outcomes	Related POs
Direct (Weightage 80%)	**Theory Courses- Internal Assessment (Weightage 60%)**			
	Theory- Term Test (25 marks)	Three written tests are conducted and average of best two is considered	The questions in the three Term Tests, Quiz and Assignment are framed in such a way that they cover all the COs of respective course. The final attainment for each CO under direct assessment is calculated by taking average of the CO attainments from Term Tests, Assignment and Quiz.	PO1 to PO7
	Assignment (5 marks)	Two Assignments for each course and the average of two is considered.		
	Quiz (10 marks)	Three Quizzes are conducted and average of best two is considered for each course		
	Theory Courses- External Assessment (Weightage 40%)			
	End Semester Examination (60 marks)	Examination at the end of the course of 03- hour duration	It covers the entire syllabus of the course. It would generally satisfy all course outcomes for a particular course. The COs are evaluated based on the set attainment levels.	PO1 to PO7
	Practical Courses - Internal Assessment (Weightage 100%)			
	Observation / Record note book (10 marks)	Submission of Observation / Record note book	Lab exercises are planned to cover all COs and CO attainment is calculated.	PO1 to PO7
	Skill Based Test (10 marks)	Day to day evaluation / Skill Test		
	Model Practical Examination (30 marks)	A Minimum of **TWO** model Exams are conducted for each lab course and the average is considered.		

Indirect (Weightage 20%)	Course Exit Survey	This survey gives the opinion of the students on attainment of Course Outcomes	At the end of each course, an exit survey is collected from the students and Considered for the CO attainment under Indirect assessment	PO1 to PO7

IV. ASSESSMENT PROCESS FOR OVERALL PO ATTAINMENT

With the help of CO against PO mapping, the PO attainment is calculated. PO assessment is done by giving 70% weightage to direct assessment and 30% weightage to indirect assessment. Direct assessment is based on CO attainment, where 40% weightage is given to attainment through End Semester examination and 60% weightage is given to attainment through internal assessments. Indirect assessment is done through Graduate exit survey and participation of students in Co-curricular / Extracurricular activities.

PO Assessment Tools

Mode of Assessment	Assessment Tool	Description
Direct Attainment (Weightage 70%)	CO Assessment	This is computed from the calculated CO Attainment value for each Course
Indirect Attainment (Weightage 30%)	Graduate Exit survey 10%	At the end of the programme, Graduate Exit Survey is collected from the graduates and it gives the opinion of the graduates on attainment of Programme Outcomes
	Co-curricular / Extracurricular activities 20%	For participation in Co-curricular / extracurricular activities during the period of their study.

Direct Attainment of POs for all Courses

At the end of the each programme, the direct PO assessment is done from the CO attainment of all courses. The direct PO attainment for a particular course is determined from the attainment values obtained for each course outcome related to that PO and the CO-PO mapping values. For the evaluation and assessment of CO's and PO's, the same set of rubrics is used.

Programme Articulation Matrix (PAM):

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Average Direct PO Attainment								
Direct PO Attainment in %								

Indirect Attainment of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Graduate Exit survey							
Indirect PO Attainment							

Indirect PO Attainment = 10% of PO Attainment from Graduate Exit survey + 20% of PO Attainment from the participation of students in Co-curricular / Extracurricular activities.

Attainments of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Direct Attainment (Weightage 70%)							
Indirect Attainment (Weightage 30%)							
Overall PO Attainment							

Overall PO Attainment = 70% of Direct PO Attainment + 30% of Indirect PO Attainment

Expected Level of Attainment for each of the Programme Outcomes

PO	Level of Attainment
Value >=70%	Excellent
Value > = 60 and value < 70	Very good
Value > = 50 and value < 60	Good
Value > = 40 and value < 50	Satisfactory
Value < 40	Not Satisfactory

Level of PO attainment

Graduation Batch	Overall PO Attainment	Whether Expected level of PO is achieved?

V. ASSESSMENT PROCESS FOR PEOs

The curriculum is designed so that all courses contribute to the achievement of PEOs. The attainment of PEOs is measured only through Indirect methods.

Type of Assessment	Assessment Tool	Assessment criteria	Data collection frequency	Responsible entity	Indicators for Attainment of PEO
Indirect Weightage 100%	Placement Record Weightage 20%	Number of students Placed	Once in a year	Placement cell and Department	PEO-1 PEO-2 PEO-3
	Higher Education Weightage 20%	Number of students opted for higher education	Once in a year	Department	PEO-1 PEO-2 PEO-3
	Record of Entrepreneurship 10%	Number of Entrepreneurs	Once in a year	YWED cell and Incubation Centre	PEO-1 PEO-2 PEO-3
	Alumnae Survey Weightage 30%	Alumnae Survey is collected from the alumnae and it gives the opinion of the alumnae on attainment of Programme Outcomes and their achievements.	Once in a year	Alumnae Association	PEO-1 PEO-2 PEO-3
	Feedback from Parents 10%	Feedback from parents is collected and it gives the opinion of the parent on attainment of Programme Outcomes of their ward.	Once in a year	Parents Teachers Association	PEO-1 PEO-2 PEO-3
	Feedback from Employer 10%	Feedback from the employer is collected and it gives the opinion of the employers on attainment of Programme Outcomes of their employee.	Once in a year	Placement Cell and Department	PEO-1 PEO-2 PEO-3

Target for PEO attainment

Assessment criteria	Target
Record of Placement	30 % of the class strength
Progression to Higher Education	25 % of the class strength
Record of Entrepreneurship	5 % of the class strength

Attainment of PEOs

Assessment Tool	Attainment of PEO
Record of Placement	
Progression to Higher Education	
Record of Entrepreneurship	
Alumnae Survey Weightage	
Feedback from Parents	
Feedback from Employer	
Total Attainment	

Percentage of PEO Attainment from placement $= \frac{\text{Number of students who have got placement}}{\text{Target}}$ x 100

Percentage of PEO Attainment from higher studies $= \frac{\text{Number of students who pursue higher studies}}{\text{Target}}$ x 100

Percentage of PEO Attainment from entrepreneurship $= \frac{\text{Number of students who have become entrepreneur}}{\text{Target}}$ x 100

PEO Attainment = 10% Attainment from placement + 20 % Attainment from higher studies + 10% Record of Entrepreneurs + 30% attainment of Alumnae survey + 10% Attainment from Parents Feedback + 20% Attainment from Employers Feedback

Expected Level of Attainment for each of the Programme Educational Objectives

PEO	Level of Attainment
Value >=70%	Excellent
Value > = 60 and value < 70	Very good
Value > = 50 and value < 60	Good
Value > = 40 and value < 50	Satisfactory
Value < 40	Not Satisfactory

Level of PEO attainment

Graduation Batch	Overall PEO Attainment	Whether Expected level of PEO is achieved?

Process of Redefining the PEOs:

The college has always been involving the key stake holders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected the objectives of the programme are defined, refined and are inscribed in the form of PEO's. The level of attainment of PEO's defined earlier will be analyzed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like BOS, Academic Council and Governing Body involve appropriate actions.

VI. Eligibility Condition for Admission:

1. For admission to Under Graduate Programme in Physics, a candidate must have passed the Higher Secondary Examination of Tamil Nadu or an examination (like the CBSE) recognized by the universities as equivalent there to, who have opted Group I in Plus Two with the following subjects in part III Physics (100), Mathematics (100), Chemistry (100), Biology/Computer Science (100).
2. Based on the rank list prepared for a total of 400 marks in the above subjects and subject to the norms as specified by the Government, admission will be made.
3. The upper age limit for admission to U.G. Programme will be 21 (twenty one) years as on 1st July of the year of admission. However, a relaxation of 5 years is permitted for differently abled as per G.O.Ms.No.239, S.W. dated 3-9-93. SC/ST/BC/MBC/DNC candidates and women candidates may be allowed the age relaxation of 3 years beyond 21 years for the admission into UG Programme.

VII. Duration of the Programme:

The duration of the programme is three academic years. Each academic year consists of two semesters. The duration of a semester is 90 working days.

VIII. Attendance:

The Rules regarding the attendance for regular classes for the candidates to appear for the End Semester Examinations are framed as given below:

a) Each student must put in a minimum attendance of 68 days (75% of 90 days per semester) so as to become eligible to appear for the End Semester examinations.

Shortage of Attendance:

b) Those students with an attendance of 67 days and less but 59 days (65%) and above can be permitted to appear for the End Semester Examinations provided, they get the condonation certificate from the Principal stating the proper reasons for the absence, within 5 days after the last working day of the concerned class. The certificate may be obtained from the office on payment of penalty as per Madurai Kamaraj University Norms.

c) In case of attendance with 58 days and less but 45 days (50%) and above, the students cannot appear for the End Semester Examinations of that semester but can appear for the next End Semester Examinations by obtaining special permission from the Principal

providing necessary documents supporting the reasons for absence on payment of penalty as per Madurai Kamaraj University Norms.

d) Students with an attendance of 44 days and less should repeat the whole semester.

Attendance for Part V

A student of the first or second year undergraduate class should put in a minimum attendance of 75% for each semester (Total No. of hours as fixed by the concerned Officers / Staff in-charge) in anyone of the Co-Curricular activities namely Social Service League / Youth Red Cross/ Red Ribbon Club / Environment Club / Citizen Consumer Club / Extension Activities Cell / Physical Education / National Cadet Corps / National Service Scheme to be eligible to get the degree.

In case of shortage of attendance, the student has to complete the required attendance before the completion of the Programme. If she fails to do so the student can appear for the end semester examination; but she is ineligible to get the degree.

IX. Evaluation Procedure:

Evaluation of each theory course will be 40 % for CIA and 60 % for End Semester Examinations. Evaluation of each Practical Course will be 50% for CIA and 50% for End Semester Examinations. Project will be evaluated for 100% in the End Semester Examinations. A mark statement will be issued to every student at the end of every semester.

X. Passing Minimum:

For a pass in each course a student should secure a minimum of 35% marks in the End Semester Examinations and a minimum of 40% marks in aggregate (i.e. marks of CIA and End Semester Examinations put together). The same rule is applicable for Dissertation / Project Report and Viva-Voce.

Minimum credits to be earned for B.Sc Programme is 140 credits.

For Part V Swachh Bharat Scheme Internship, NPTEL and SWAYAM courses TWO credits will be given as extra credits.

XI. Eligibility Condition for getting the Degree:

A Candidate undergoing the B.Sc degree Programme in Physics will be eligible for the award of degree in Physics, if she completes the entire Programme and pass all the examinations prescribed for the Programme.

As per UGC guidelines, a student who is not able to complete the Programme within three years, may be allowed for **2 years** period beyond the two years duration to clear the backlog to be qualified for the degree.

XII. Classification of Successful Candidates:

The successful candidates will be classified as per the details given in the table below:

CGPA	Grade	Classification of Final Result
9.50000 – 10.00000	O+	First Class
9.00000 – 9.49999	O	
8.50000 – 8.99999	D++	
8.00000 – 8.49999	D+	
7.50000 – 7.99999	D	
7.00000 – 7.49999	A++	
6.50000 – 6.99999	A+	
6.00000 – 6.49999	A	
5.50000 – 5.99999	B+	Second Class
5.00000 – 5.49999	B	
4.50000 – 4.99999	C+	Third Class
4.00000 – 4.49999	C	
0.00000 – 3.99999	U	Re-appear

XIII. Award of Ranks:

Candidates who qualify themselves for the respective degree programme passing all the examinations in the first attempt and secured first class are eligible for ranking I and II from the CGPA gained in the Major, Major Elective and Allied courses.

$$\textbf{CUMULATIVE GRADE POINT AVERAGE [CGPA]} = \frac{\sum_i C_i G_i}{\sum_i C_i}$$

$$\textbf{CGPA} = \frac{\text{Sum of the multiplication of grade points by the respective credits of the course cleared in the entire programme}}{\text{Sum of the credits of all the courses cleared in the programme}}$$

Ci = Credits earned for course *i* in any semester

Gi = Grade point obtained for course *i* in any semester

$\sum_i$ = Summation of all courses cleared in a semester in the case of GPA and all courses cleared in all semesters in the case of CGPA.

XIV. Other Provisions:

1. In the Mark Sheet, the demarcation 'AA' will be marked against the courses for which the candidate was absent for the examination.

2. If a candidate is found indulging in malpractice, she must be expelled from the examination hall right away and debarred from appearing in all examinations of that particular semester. She can be allowed to take up examination only in the consecutive semester.
3. The courses she has already appeared during that semester will not be considered.
4. A student can appear for any number of arrear courses.
5. Repeat Examinations will be conducted for the final semester papers within a month after the publication of final semester results.
6. Revaluation is permitted.

XV. Transitory Provisions:

Students from other institutions have to appear and pass all the courses of all semesters under CBCS pattern in order to get the consolidated statement of marks.

Those students who have discontinued in the middle of the programme may be admitted in the respective semester if they want to rejoin and complete the programme; provided they had not got their transfer certificate.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI
B.Sc., Physics – Allotment of Hours and Credits
(for those who have joined in 2020 and later)

Courses			Semester						
			I	II	III	IV	V	VI	Total No.of Credits
Language Courses									
Part I – Tamil/ Hindi /French Language Course			6(3)	6(3)	6(3)	6(3)	-	-	**12**
Part II - English Language Course			6(3)	6(3)	6(3)	6(3)	-	-	**12**
Part III – Major, Major elective and Allied Courses									
Major	Theory	Course I	4(4)	5(5)	5(5)	5(5)	6(5)	6(5)	
		Course II	3(3)	-	4(4)	-	-	5(5)	
	Practical	Lab I	3(*)	3(4)	3(*)	3(4)	6(5)	6(5)	
		Internship/ On-The-Job Training	-	-	-	-	(1)	-	
		Project	-	-	-	-	3(*)	3(3)	
Major Elective	Theory	Course I	-	-	-	-	5(5)	5(5)	
		Course II	-	-	-	-	5(4)	-	
Allied	Theory		4(4)	4(4)	4(4)	4(4)	-	-	
	Practical		2(*)	2(2)	2(*)	2(2)	-	-	
Total No. of Credits			**11**	**15**	**13**	**15**	**20**	**23**	**97**
Part-IV Ability Enhancement Courses									
Value Added Courses									
1) Environmental Studies			2(2)	-	-	-	-	-	
2) Value Education & Gender studies			-	2(2)	-	-	-	-	
Non Major Elective Courses									
1) NME I			-	-	-	2(2)	-	-	
2) NME II			-	-	-	-	2(2)	-	
Skill Based Courses									
1) Computer Literacy			-	2(2)	-	-	-	-	
2) Discipline Specific Course			-	-	-	2(2)	-	-	
3) Career Guidance			-	-	-	-	2(2)	-	
4) Self Employment / Job Oriented Courses – **Theory**			-	-	-	-	-	2(2)	
5) Self Employment/ Job Oriented Courses – **Practical / Project**			-	-	-	-	-	2(2)	
Library and Information Science			-	-	-	-	1(*)	1(*)	
Total			**2**	**4**	**-**	**4**	**4**	**4**	**18**
Part-V: Social Awareness Programme and Physical Education									
National Service Scheme /National Cadet Corps /Extension Activities/Youth Red Cross and Blood Donors Club / Social Service League/Red Ribbon Club/Citizen Consumer Club/Environment Club / Physical Education			1(*)	1(1)	-	-	-	-	**1**
Total Credits									**140**

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS PROGRAMME
(For those who have joined in 2020 and later)
OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM
PROGRAMME CODE – BDPH
PROGRAMME SCHEME

Component	Course Code	Course Title	Teaching Hours Per Week	Credits	Duration of Exam. (Hrs.)	Marks Allotted		
						Internal	External	Total
Semester I								
Part I	BDGT11/ BDGH11/ BDGF11	சங்க இலக்கியமும் உரைநடையும் / Hindi Language Course – I / French Language Course – I	6	3	3	40	60	100
Part II	BDGE11	English for Communication - I	6	3	3	40	60	100
Part III	BDPH11	**Major Courses** Mechanics and Properties of Matter	4	4	3	40	60	100
	BDPH12	Physics applications in Everyday life	3	3	3	40	60	100
	-	Properties of Matter Lab	3	-	-	-	-	-
	BDCH1A	**Allied Courses** Fundamentals of Chemistry	4	4	3	40	60	100
	-	Volumetric Analysis	2	-	-	-	-	-
Part IV	BDES11	**Value Added Course** Environmental studies	2	2	2	40	60	100
		Total	**30**	**19**				**600**
Semester II								
Part I	BDGT21/ BDGH21/ BDGF21	அற இலக்கியமும் தன்முன்னேற்றக் கட்டுரைகளும் / Hindi Language Course -II / French Language Course – II	6	3	3	40	60	100
Part II	BDGE21	English for Communication - II	6	3	3	40	60	100
Part III	BDPH21	**Major Courses** Optics	5	5	3	40	60	100
	BDPH2L	Properties of Matter Lab	3	4	3	50	50	100
	BDCH2A	**Allied Courses** Physical and Industrial Chemistry	4	4	3	40	60	100
	BDCH2AL	Volumetric Analysis	2	2	3	50	50	100
Part IV	BDVG21	**Value Added Course** Value Education & Gender Studies	2	2	2	40	60	100
	BDCL23	**Skill Based Course** Introduction to Computers & MS office	2	2	2	40	60	100
Part V	BDSA2	**Social Awareness Programme and Physical Education**	-	1	-	-	-	100
		Total	**30**	**26**				**900**
Field visit mandatory for the course BDPH21 – Optics								
Semester III								
Part I	BDGT31/ BDGH31/ BDGF31	சமய இலக்கியமும் நாடகமும் / Hindi Language Course –III / French Language Course – III	6	3	3	40	60	100
Part II	BDGE31	English for Enrichment-I	6	3	3	40	60	100
Part III	BDPH31	**Major Courses** Electricity	5	5	3	40	60	100
	BDPH32	Electromagnetism	4	4	3	40	60	100

	-	Electricity and Electronics lab	3	-	-	-	-	-
	BDMT3A1	**Allied Courses** Allied Mathematics – I	6	5	3	40	60	100
		Total	**30**	**20**				**500**
Field visit mandatory for the course BDPH32- Electromagnetism								
Semester IV								
Part I	BDGT41/ BDGH41/ BDGF41	கவிதை இலக்கியமும் சிறுகதையும் / Hindi Language Course -IV/ French Language Course – IV	6	3	3	40	60	100
Part II	BDGE41	English for Enrichment-II	6	3	3	40	60	100
Part III	BDPH41	**Major Courses** Basic Electronics	5	5	3	40	60	100
	BDPH4L	Electricity and Electronics lab	3	4	3	50	50	100
	BDMT4A1	**Allied Course** Allied Mathematics – II	6	5	3	40	60	100
Part IV	BD4N	**Non Major Elective Course**	2	2	2	40	60	100
	BDPH4DSL	**Skill Based Course** **Discipline Specific Course** Lab - Scientific Skill Development	2	2	3	50	50	100
		Total	**30**	**24**				**700**
Semester V								
Part III	BDPH51	**Major Courses** Classical Mechanics	6	5	3	40	60	100
	BDPH5L	Physics Lab – I	6	5	3	50	50	100
	-	Project	3	-	-	-	-	-
	BDPH5V	Internship/ On –The - Job Training	-	1	-	-	100	100
	BDPH5E1 / BDPH5E3	**Major Elective Courses** Digital Electronics / Fibre optics	5	5	3	40	60	100
	BDPH5E2 / BDPH5E4	Atomic and Nuclear Physics / Energy physics	5	4	3	40	60	100
Part IV	BD5N	**Non Major Elective Course**	2	2	2	40	60	100
	BDCG51	**Skill Based Course** Career Guidance	2	2	2	40	60	100
	-	Library and Information Science	1	-	-	-	-	-
		Total	**30**	**24**				**700**
Study tour / Field visit mandatory for the course BDPH5L - Physics Lab – I								
Semester VI								
Part III	BDPH61	**Major Courses** Fundamentals of Solid State Physics	6	5	3	40	60	100
	BDPH62	Quantum Physics and Relativity	5	5	3	40	60	100
	BDPH6L	Physics Lab – II	6	5	3	50	50	100
	BDPH6P	Project	3	3	3	50	50	100
	BDPH6E1/ BDPH6E2	**Major Elective Course** Thermodynamics and Statistical Thermodynamics / Instrumentation Techniques	5	5	3	40	60	100
Part IV	BDSE/ BDJO	**Skill Based Courses (Open to all)** Self Employment/ Job Oriented courses – **Theory**	2	2	2	40	60	100
	BDSE/ BDJO	Self Employment/ Job Oriented courses – **Practical**	2	2	3	50	50	100
	-	Library and Information Science	1	-	-	-	-	-
		Total	**30**	**27**				**700**

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
COURSES OFFERED FOR OTHER MAJOR STUDENTS

Component	Course Code	Course Title	Teaching Hours Per Week	Credits	Duration of Exam. (Hrs.)	Marks Allotted		
						Internal	External	Total
Semester I								
Part III	BDPH1A	**Allied Courses for Chemistry and Maths Major Students** Fundamental Physics	4	4	3	40	60	100
	-	Fundamental Physics Lab	2	-	-	-	-	-
Semester II								
Part III	BDPH2A1	**Allied Courses for Maths Major Students** Digital Electronics	4	4	3	40	60	100
	BDPH2A2	**Allied Courses for Chemistry Major Students** Solid State Physics and Digital Electronics	4	4	3	40	60	100
	BDPH2AL	Fundamental Physics Lab	2	2	3	50	50	100
Semester IV								
Part IV	BDPH4N	**Non Major Elective Course** Basics of Solar energy	2	2	2	40	60	100
Semester V								
Part IV	BDPH5N	**Non Major Elective Course** Physics for the new world	2	2	2	40	60	100
Semester VI								
Part IV	BDSE66	**Skill Based Courses (Open to all) Self Employment Courses** Domestic Electrical Appliances Servicing	2	2	2	40	60	100
	BDSE66L	Domestic Electrical Appliances Servicing – Lab	2	2	3	50	50	100

Extra Credit Course (Open to All)

Semester	Course Code	Course Title	Total Contact Hours	Credits	Duration of Exam (Hours)	Marks Allotted		
						Internal	External	Total
	ADPHEC1	Nanotechnology	2	2	3	40	60	100
	ADPHEC2	Physics for Competitive examinations	2	2	3	40	60	100

B.Sc Physics

Programme Articulation Matrix (PAM) -Weights

Course Code	Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
BDGT11/ BDGH11/ BDGF11	சங்க இலக்கியமும் உரைநடையும் / Hindi Language Course - I/, French Language Course - I	15	15	9	3	0	6	0
BDGE11	English for Communication – I	11	13	3	13	3	7	3
BDPH11	Mechanics and Properties of Matter	39	33	33	5	0	0	5
BDPH12	Physics Applications in Everyday Life	25	23	9	5	0	0	5
BDCH1A	Fundamentals of Chemistry	27	9	13	9	0	0	0
BDES11	Environmental studies	15	13	7	4	0	4	3
BDGT21/ BDGH21/ BDGF21	அற இலக்கியமும் தன்முன்னேற்றக் கட்டுரைகளும் / Hindi Language Course – II / French Language Course – II	15	13	4	0	0	6	0
BDGE21	English for Communication – II	11	13	3	13	3	7	3
BDPH21	Optics	39	33	15	5	0	0	0
BDPH2L	Properties of Matter Lab	31	30	24	2	5	5	5
BDCH2A	Physical and Industrial Chemistry	33	9	9	11	0	0	0
BDCH2AL	Volumetric Estimation	45	33	21	0	0	39	27
BDVG21	Value Education & Gender Studies	13	13	0	11	15	13	9
BDCL23	Introduction To Computers & MS Office	13	10	0	12	0	0	9
BDSA2	Social Awareness Programme and Physical Education	0	0	0	13	13	5	9
BDGT31/ BDGH31/ BDGF31	சமய இலக்கியமும் நாடகமும் / Hindi Language Course –III /French Language Course – III	15	9	9	5	0	3	0
BDGE31	English for Enrichment-I	11	13	5	13	5	7	3
BDPH31	Electricity	39	33	33	5	0	0	5
BDPH32	Electromagnetism	39	33	15	0	0	0	1
BDMT3A1	Allied Mathematics I	33	15	9	2	0	0	0
BDGT41/BD GH41/ BDGF41	கவிதை இலக்கியமும் சிறுகதையும் / Hindi Language Course -IV/French Language Course – IV	13	15	3	2	0	1	1
BDGE41	English for Enrichment-II	11	13	5	13	5	7	3
BDPH41	Basic Electronics	39	33	33	5	0	0	5
BDPH4L	Electricity and Electronics Lab	37	33	33	3	15	5	5
BDMT4A1	Allied Mathematics – II	33	27	6	2	0	0	0

BD4N	Non Major Elective course	13	7	0	9	0	0	0
BDPH4DSL	Lab - Scientific Skill Development	31	30	30	5	0	5	5
BDPH51	Classical Mechanics	33	31	11	5	0	0	0
BDPH5L	Physics Lab – I	39	30	36	12	0	3	5
BDPH5V	Internship/On-The-Job Training	21	15	7	6	1	0	3
BDPH5EA	Elective I	39	33	27	5	0	0	5
BDPH5EB	Elective II	33	30	27	5	0	0	5
BD5N	Non Major Elective course	13	7	0	9	0	0	0
BDCG51	Career Guidance	15	9	7	1	0	2	2
BDPH61	Fundamentals of Solid State Physics	37	31	30	5	0	0	5
BDPH62	Quantum Physics and Relativity	25	16	8	5	0	0	1
BDPH6L	Physics Lab – II	30	21	27	18	0	3	5
BDPH6P	Project	37	33	33	12	15	15	5
BDPH6EC	Elective III	37	33	33	0	0	0	5
BDSE/BDJO	Self Employment/ Job Oriented courses – Theory	19	14	0	9	3	0	6
BDSE/BDJO	Self Employment/ Job Oriented courses – Practical	19	14	0	9	3	0	6
Total		**1043**	**838**	**577**	**271**	**86**	**143**	**159**

B.Sc Physics

Programme Articulation Matrix (PAM) –Weighted Percentage

Course Code	Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
BDGT11/ BDGH11/ BDGF11	சங்க இலக்கியமும் உரைநடையும் / Hindi Language Course - I/, French Language Course - I	1.44	1.79	1.56	1.11	0	4.2	0
BDGE11	English for Communication – I	1.05	1.55	0.52	4.8	3.49	4.9	1.89
BDPH11	Mechanics and Properties of Matter	3.74	3.94	5.72	1.85	0	0	3.14
BDPH12	Physics Applications in Everyday Life	2.4	2.74	1.56	1.85	0	0	3.14
BDCH1A	Fundamentals of Chemistry	2.59	1.07	2.25	3.32	0	0	0
BDES11	Environmental studies	1.44	1.55	1.21	1.48	0	2.8	1.89
BDGT21/ BDGH21/ BDGF21	அற இலக்கியமும் தன்முன்னேற்றக் கட்டுரைகளும் / Hindi Language Course – II / French Language Course – II	1.44	1.55	0.69	0	0	4.2	0
BDGE21	English for Communication - II	1.05	1.55	0.52	4.8	3.49	4.9	1.89
BDPH21	Optics	3.74	3.94	2.6	1.85	0	0	0
BDPH2L	Properties of Matter Lab	2.97	3.58	4.16	0.74	5.81	3.5	3.14
BDCH2A	Physical and Industrial Chemistry	3.16	1.07	1.56	4.06	0	0	0
BDCH2AL	Volumetric Estimation	4.31	3.94	3.64	0	0	27.27	16.98
BDVG21	Value Education & Gender Studies	1.25	1.55	0	4.06	17.44	9.09	5.66
BDCL23	Introduction To Computers & MS Office	1.25	1.19	0	4.43	0	0	5.66
BDSA2	Social Awareness Programme and Physical Education	0	0	0	4.8	15.12	3.5	5.66
BDGT31/ BDGH31/ BDGF31	சமய இலக்கியமும் நாடகமும்/ Hindi Language Course –III /French Language Course – III	1.44	1.07	1.56	1.85	0	2.1	0
BDGE31	English for Enrichment-I	1.05	1.55	0.87	4.8	5.81	4.9	1.89
BDPH31	Electricity	3.74	3.94	5.72	1.85	0	0	3.14
BDPH32	Electromagnetism	3.74	3.94	2.6	0	0	0	0.63

BDMT3A1	Allied Mathematics I	3.16	1.79	1.56	0.74	0	0	0
BDGT41/BDGH41/ BDGF41	கவிதை இலக்கியமும் சிறுகதையும் / Hindi Language Course - IV/French Language Course – IV	1.25	1.79	0.52	0.74	0	0.7	0.63
BDGE41	English for Enrichment-II	1.05	1.55	0.87	4.8	5.81	4.9	1.89
BDPH41	Basic Electronics	3.74	3.94	5.72	1.85	0	0	3.14
BDPH4L	Electricity and Electronics Lab	3.55	3.94	5.72	1.11	17.44	3.5	3.14
BDMT4A1	Allied Mathematics II	3.16	3.22	1.04	0.74	0	0	0
BD4N	Non Major Elective course	1.25	0.84	0	3.32	0	0	0
BDPH4DSL	Lab - Scientific Skill Development	2.97	3.58	5.2	1.85	0	3.5	3.14
BDPH51	Classical Mechanics	3.16	3.7	1.91	1.85	0	0	0
BDPH5L	Physics Lab – I	3.74	3.58	6.24	4.43	0	2.1	3.14
BDPH5V	Internship/On-The-Job Training	2.01	1.79	1.21	2.21	1.16	0	1.89
BDPH5EA	Elective I	3.74	3.94	4.68	1.85	0	0	3.14
BDPH5EB	Elective II	3.16	3.58	4.68	1.85	0	0	3.14
BD5N	Non Major Elective course	1.25	0.84	0	3.32	0	0	0
BDCG51	Career Guidance	1.44	1.07	1.21	0.37	0	1.4	1.26
BDPH61	Fundamentals of Solid State Physics	3.55	3.7	5.2	1.85	0	0	3.14
BDPH62	Quantum Physics and Relativity	2.4	1.91	1.39	1.85	0	0	0.63
BDPH6L	Physics Lab – II	2.88	2.51	4.68	6.64	0	2.1	3.14
BDPH6P	Project	3.55	3.94	5.72	4.43	17.44	10.49	3.14
BDPH6EC	Elective III	3.55	3.94	5.72	0	0	0	3.14
BDSE/BDJO	Self Employment/ Job Oriented courses – Theory	1.82	1.67	0	3.32	3.49	0	3.77
BDSE/BDJO	Self Employment/ Job Oriented courses – Practical	1.82	1.67	0	3.32	3.49	0	3.77
Total		100	100	100	100	100	100	100

தி ஸ்டாண்டர்டு ∴பயர்ஒர்க்ஸ் இராஜரத்தினம் மகளிர் கல்லூரி (தன்னாட்சி), சிவகாசி
தமிழ்த்துறை
இளநிலை முதலாம் ஆண்டு – முதல் பருவம்
பகுதி – I - பொதுத்தமிழ்
BDGT11- சங்க இலக்கியமும் உரைநடையும்
(ஜூன் 2020ஆம் ஆண்டில் சேர்ந்தவர்களுக்கும் அதற்குப்பின் சேர்பவர்களுக்கும் உரியது)

ஒரு வாரத்திற்குரிய பாட மணிநேரம் : 06 (5 + 1)

ஒரு பருவத்திற்குரிய மொத்த பாட மணிநேரம் : 90 (75 + 15)

தாளின் மதிப்பு : 03

இப்பாடத்தை முழுமையாகக் கற்றபின் மாணவியர் பெறும் திறன்கள்:

CO1[K2]: எழுத்திலக்கணம், சங்க இலக்கியப்பாடல் மற்றும் கட்டுரைகளின் உட்பொருளை எடுத்துரைப்பர்.

CO2[K3]: சங்கஇலக்கியப்பாடல் மற்றும் கட்டுரைகள் பதிவுசெய்துள்ள அகவாழ்வியலைச் சான்றுகளுடன் விளக்குவர்.

CO3[K4]: சங்கஇலக்கியப்பாடல் மற்றும் கட்டுரைகள் பதிவுசெய்துள்ள புறவாழ்வியலை வரிசைப்படுத்துவர்.

CO4[K4]: எழுத்திலக்கண விதிகள் மற்றும் படைப்பாளர்களின் கருத்துப்புலப்பாட்டுத்திறனை ஆய்ந்துரைப்பர்.

CO5[K5]: மக்களின் சமுதாயநிலையை இலக்கியக்கட்டுரைகளின் வழி மதிப்பிடுவர்.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	3	-	3	-
CO2	3	3	1	-	-	1	-
CO3	3	3	1	-	-	1	-
CO4	3	3	3	-	-	-	-
CO5	3	3	3	-	-	1	-
Weightage of the course	**15**	**15**	**9**	**3**	**0**	**6**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.79**	**1.56**	**1.11**	**0**	**4.2**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

கூறு 1: **(15வி + 03ப)**

நற்றிணை - 32, 226.பாடல்கள்
குறுந்தொகை - 2, 3, 23, 92, 167பாடல்கள்.
ஐங்குறுநூறு - 44 (புறவணிப்பத்து)
அகநானூறு - 4வதுபாடல்
கலித்தொகை - பாலைக்கலி (9வதுபாடல்)
புறநானூறு - 182, 192, 195, 312பாடல்கள்

கூறு 2: **(15வி + 03ப)**

சிறுபாணாற்றுப்படை – 84 அடிகள் முதல் 195 அடிகள் வரை (112 அடிகள்)

கூறு 3: **(15வி + 03ப)**

உரைநடை - சங்க இலக்கியக் கட்டுரைகள் (1-8 கட்டுரைகள்)

கூறு 4: **(15வி + 03ப)**

உரைநடை- சங்க இலக்கியக் கட்டுரைகள் (9-16 கட்டுரைகள்)

கூறு 5: **(15வி+ 03ப)**

எழுத்திலக்கணம் : முதலெழுத்துகள் - சார்பெழுத்துகள் - மொழிக்கு முதலில் வரும் எழுத்துகள் - மொழிக்கு இறுதியில் வரும் எழுத்துகள்
இலக்கியவரலாறு : பாடப்பகுதியோடு தொடர்புடைய இலக்கியவரலாறு

பாடநூல்கள் :

1. தமிழ்த்துறைப் பதிப்புக்குழு - செய்யுட் கொத்து,
தமிழ்த்துறை வெளியீடு,
எஸ்.எ.ட்.ப்.ஆர்.மகளிர் கல்லூரி, சிவகாசி.
2020.
2. தமிழ்த்துறைப் பதிப்புக்குழு - சங்கஇலக்கியக் கட்டுரைகள்,
நியூசெஞ்சுரி புக்ஹவுஸ்,
பிரைவேட் லிமிடெட், .
சென்னை.
2020.

பார்வை நூல்கள் :

1. ஜெ. ஸ்ரீசந்திரன் - தமிழ் இலக்கிய வரலாறு,
வர்த்தமானன் பதிப்பகம்,
தியாகராய நகர்,
சென்னை.
பத்தாம் பதிப்பு - 2002.
2. கு.வெ. பாலசுப்பிரமணியன் - சங்க இலக்கியத்தில் கலையும்
கலைக்கோட்பாடும்,
உலகத்தமிழாராய்ச்சி நிறுவனம்,
சென்னை - 1998.

Tutorials : (பயிற்சி)

Topic	Unit	Constructive Alignment – Learning Activity
தமிழர் வாழ்வியல்	I	Group Discussions
கொடைச்சிறப்பு	II	Mindmap
சங்க இலக்கியத்தில் அகம்	III	Presentation
சங்க இலக்கியத்தில் புறம்	IV	Group Discussions
எழுத்துக்களின் வகைகள்	V	Mindmap

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTER I
PART – I – HINDI LANGUAGE COURSE
BDGH11 - HINDI LANGUAGE COURSE - I
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the significant contributions of the writers and the basics of grammar in writings
CO2[K2]: explain the renowned literary pieces
CO3[K3]: identify the techniques and writing style of writers
CO4[K4]: analyse the literary elements in the works of writers, expand proverbs
CO5[K5]: appraise the works of writers

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	3	0	3	0
CO2	3	3	1	0	0	1	0
CO3	3	3	1	0	0	1	0
CO4	3	3	3	0	0	0	0
CO5	3	3	3	0	0	1	0
Weight age of the course	**15**	**15**	**9**	**3**	**0**	**6**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.79**	**1.56**	**1.11**	**0**	**4.2**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit - I : Poetry (15L+5T)

Ancient Poet :Kabirdas - 10 Doha (No.1 to 10)
Modern Poets :Mythilisharan Gupta - 1, 2; MakanlalChaturvedi - 1, 2
HarivamsaroyBachan - 1, 2.

Unit - II : Prose (15L+ 5T)

Jaishankar Prasad- "Aakash Deep",Premchand- "ShatranjKeKiladi", "Jeevan Mein SahityaKaSthan", Mahavir Prasad Dwivedi- "JeevanKadha", MahadeviVerma-"Vah Cheeni Bai"

Unit - III : Grammar **(15L)**

Noun, Pronoun, Adjective- Definitions and main divisions only, Comprehension.

Unit - IV : Proverbs **(15L)**

Expansion of Proverb 1-10

Unit - V :One-Act Play **(15L+ 5T)**

Vinod Rastogi- *Bahu Ki Vida*, Kattabomman- *P. Avadhanandhan*, William Shakespeare- *KhunKaBathala*

Reference Books:

GadhyaKusum -3. Chennai: Dhakshina Bharat Hindi Prachar Sabha, 2009.

Hindi Prachar Vahini-3. Chennai: D.B.H.P.Sabha, 2019.

KavyaKusum – 3. Chennai: Dhakshina Bharat Hindi Prachar Sabha, 2009.

PrashnotharSahitRashtrabashaPaatyaSaamagr. Chennai: Dhakshina Bharat Hindi Prachar Sabha, 2016.

Ramdev. *Vyakaran Pradeep*. Allahabad:HindiBhavan, 2009.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Poetry	I	Interactive Quiz/ Presentation
Prose	II	Interactive Quiz/ Presentation
One-Act Play	V	Role Play

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTER I
PART – I – FRENCH LANGUAGE COURSE
BDGF11 - FRENCH LANGUAGE COURSE- I
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the basic elements of grammar in French and tell time in French
CO2[K2]: explain the grammatical concept
CO3[K3]: use grammar in framing questions in French
CO4[K4]: analyse the importance of French in day to day life
CO5[K5]: assess the usage of French grammar in a workplace

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	3	0	3	0
CO2	3	3	1	0	0	1	0
CO3	3	3	1	0	0	1	0
CO4	3	3	3	0	0	0	0
CO5	3	3	3	0	0	1	0
Weight age of the course	**15**	**15**	**9**	**3**	**0**	**6**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.79**	**1.56**	**1.11**	**0**	**4.2**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit- I **(15L+ 5T)**

1. Se présenter
2. L'articleindéfini&L'articledéfini
3. ER verb conjugation

Unit- II **(15L)**

1. Irregular verb conjugation (être , avoir , aller , faire , savoir)
2. Les nombres
3. Usage of aimer / préférer
4. Les professions

Unit- III **(15L)**

1. Quelleheureest - il ?
2. Les pronomsinterrogatifs

Unit- IV **(15L+5T)**

1. Les adjectifsdémonstratif
2. L' Impératif
3. La conjugaisonpronominale
4. L'expression de la possession

Unit- V **(15L+5T)**

1. Le passé composé
2. Les pronomsindéfinis
3. Les articles partitifs

Text Book:

Campus 1 - C.L.E International - Paris,2002

Jacky Girardet et JaquesPécheur

Unités : 1 to 6

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Se présenter	I	Presentation
Festivals celebrated in France	IV	Video
Describing the routine life using reflexive verbs	V	Narration

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A/B.Com/B.B.A DEGREE PROGRAMME
SEMESTER I
PART II– ENGLISH
BDGE11 – ENGLISH FOR COMMUNICATION - I
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture + Tutorial) :90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the content through the study of language and literature
CO2 [K2]: comprehend and respond to passages, situations and texts
CO3 [K3]: apply appropriate vocabulary and construct ideas
CO4 [K4]: analyze the prescribed literary pieces
CO5 [K5]: develop grammatical structures accurately and appraise literature

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	0	1	1	1	0
CO2	1	3	0	3	1	0	1
CO3	3	3	1	3	1	0	1
CO4	3	3	1	3	0	3	0
CO5	3	3	1	3	0	3	1
Weightage of the course	**11**	**13**	**3**	**13**	**3**	**7**	**3**
Weighted percentage of Course contribution to POs	**1.05**	**1.55**	**0.52**	**4.8**	**3.49**	**4.9**	**1.89**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit - I : Listening and Speaking (13L+5T)

Expressing personal opinions
Greetings and Introductions
Making Request
Seeking Permission
Seeking Information

Unit - II : Reading (18L)

Reading and understanding short notices and messages.
Reading for detailed comprehension.

Unit - III : Writing **(18L)**

Writing to communicate in response to input:
Email, letter writing, interpretation.

Unit - IV : Grammar and English Usage **(13L+5T)**

Articles
Prepositions
Question Tags
Words often confused
Vocabulary : 30 Phrasal Verbs (1-30)

Unit - V : Language through Literature **(13L+5T)**

Poetry:

P. B. Shelley - "To a Skylark"
Robert Frost - "Stopping by Woods on a Snowy Evening"
Rabindranath Tagore - "Where the Mind is without Fear"

Prose:

Dr. K. P.Parthasarathy - "Don't Treat Yourself"
M. K. Gandhi - "The First Case"
Stephen Leacock - "My Lost Dollar"

Reference Books:

Amin, Mohamed.A.K. *Wings of Poesy.* Chennai: NCHB, 2006.

Augustine, A.E. and K.V.Joseph. *Macmillan Grammar: A Handbook.* New Delhi: Macmillan India Ltd., 2007.

Natarajan.K. *Enlightening English Prose*, Chennai: NCHB, 2012.

Reading Cards, CIEFL, Project English 400 (MHRD), Orient Longman Publications, 1992.

Ravindran Padma, M.Y.AbdurRazack and Poorvadevi.D. *English For Life.* Trichy: Ebek Language Laboratories Private Limited, 2011.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Listening and Speaking	I	Orell Software in Language Lab& Presentation
Grammar and English Usage	IV	Interactive Quiz& Gamification
Language through Literature Poetry Prose	V	Group Discussion, Video/Film & Debate

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER I
PART - III - MAJOR COURSE
BDPH11 –MECHANICS AND PROPERTIES OF MATTER
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) :04 (03+01)
Total number of hours per semester(Lecture hour + Tutorial):60 (45+15)
Total number of Credits :04

Course Outcomes:
On successful completion of the course, the learners should be able to

CO1[K2]: describe the concepts of Newton's laws of motion, moment of inertia, oscillations, viscosity, elasticity and bending of beams.
CO2[K2]: explain frames of reference, moment of inertia of rigid bodies, types of oscillators, theorems of viscosity, Young's modulus and Poisson ratio.
CO3[K3]: apply the laws of mechanics and properties of matter to solve problems.
CO4[K4]: analyse the transformation in frames of reference, dynamics of rigid bodies, various parameters of oscillators, fluid mechanics and distinguish moduli of elasticity.
CO5[K5]: evaluate the parameters related to mechanics and properties of matter.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**39**	**33**	**33**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.74**	**3.94**	**5.72**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I (9L+3T)

Newton's laws of Motion – Reference Frame:

Introduction – some important terms - Rest and Motion – Reference Frame – Absolute space; Time and motion – Newton's laws of motion – Newton's first law of motion is simply A special case

of second law – Limitation's of Newton's laws of motion – Frames of reference: Inertial and Non Inertial – Galilean transformation – Frames of reference with linear acceleration – Classical relativity – Galilean invariance – Transformation equations for a frame of reference inclined to an inertial frame – Transformation equations for a rotating frame of reference

Unit – II **(9L+3T)**

Dynamics of Rigid Bodies:

Rigid body – translational and rotational motion – Torque – Angular Momentum – Angular Impulse- Moment of inertia – Radius of Gyration – Dimensions and units of moment of inertia- Analogous parameters in translational and rotational motion – General theorems on moment of inertia – Calculation of moment of inertia – Particular cases of moment of inertia (Moment of inertia of a uniform rod, rectangular lamina, thin circular ring, solid cylinder and solid sphere)– Moment of inertia of a flywheel – experimental determination

Unit – III **(9L+3T)**

Simple Harmonic Motion& Damped Oscillations:

Periodic and Harmonic Motion – Harmonic Oscillator – Simple harmonic motion: Differential equation of S. H. M – Phase relationship between displacement, velocity and acceleration of S. H. Oscillator – Energy of a harmonic oscillator – Average values of kinetic and potential energies of a harmonic oscillator – Some examples of S. H. M (Simple pendulum and Torsion pendulum) – Two body harmonic oscillator – Oscillation of a diatomic molecule – Damping (Frictional effects) – Damped harmonic oscillator

Unit –IV **(9L+3T)**

Fluid Mechanics - Viscosity:

Laminar or viscous flow – Viscosity – Newton's law of viscous flow – Coefficient of viscosity – Viscosity, a fugitive rigidity- Steady or streamline and turbulent flow – lines and tubes of flow – Equation of continuity of flow – Energy of the fluid - Bernoulli's theorem – Euler's equation – Applications of Bernoulli's theorem (Venturimeter and Pitot tube) – Velocity of efflux of a liquid – Torricelli's theorem –Critical velocity- Significance of Reynold's number - Poiseuille's equation for liquid flow through a narrow tube – Poiseuille's method for determining coefficient of viscosity of a liquid

Unit –V **(9L+3T)**

Elasticity and Bending of beams:

Introduction - Load, Stress and strain – Hooke's law - Elastic limit – behavior of a wire or a bar under increasing stress – Elastic behaviour or solids in general - Different types of elasticity – Poisson's ratio – Relations connecting the elastic constants – Limiting values of Poisson's ratio- Determination of Young's modulus for a material – Determination of Poisson's ratio – Twisting couple on a cylinder – Determination of the coefficient of rigidity for the material of a wire –Beam – Bending of a beam – some definitions – Bending moment – The cantilever – depression of its loaded end – Determination of Y for the material of a cantilever - Determination of young's modulus for a material of a beam – method of bending

Text Book:

Prof. D. S. Mathur Revised by Dr. P. S. Hemne, – Mechanics
S. Chand & Company Pvt . Ltd, Revised edition 2012

Reference Books:

1. Resnick, Halliday and Krane - Physics, Fifth edition, Voulme 1, Wiley Student Edition
2. S. L. Kakani , C. Hemaranjani and Shubhra Kakani - Mechanics, Viva Books Private Limited, New Delhi
3. L.P.Sharma & C.Saxena - Oscillations, Waves and Sound , Chand & Company Ltd., New Delhi, 1st Edition 1984.
4. BrijlalSubrahmanyam - Properties of Matter, S.Chand & Company Limited,Fifth Edition -1989.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Newton's laws of Motion	I	Scrap book/ Mind Map/Video/ Interactive quizzes
Moment of inertia	II	Case Study/Presentation Group discussion/debate/ Scrap book/ Mind Map/Video/ Interactive quizzes
Simple Harmonic Motions	III	Case Study/Presentation /Mind Map/Video/Display
Bernoulli's theorem	IV	Display/ Case Study/Presentation /Mind Map/Video
Elasticity and Bending of beams	V	Display/ Case Study/Presentation /Mind Map/Video

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER I
PART – III - MAJOR COURSE
BDPH12 – PHYSICS APPLICATIONS IN EVERYDAY LIFE
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 03 (02+01)
Total number of hours per semester(Lecture hour + Tutorial): 45 (30+15)
Total Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: describe the basics of electricity, thermal physics, lasers, geographic information system and solar energy.
CO2 [K2]: explain the concepts of electricity, thermal physics, geographic information system, laser and solar energy
CO3 [K3]: solve problems in the field of electricity, Laser, thermal physics and solar energy
CO4 [K4]: classify single-phase supply, three phase supply and types of solar cookers.
CO5 [K5]: appraise the applications of lasers and solar energy.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	1	0	0	1
CO2	3	1	1	1	0	0	1
CO3	3	3	1	1	0	0	1
CO4	9	9	3	1	0	0	1
CO5	9	9	3	1	0	0	1
Weightage of the course	**25**	**23**	**9**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**2.4**	**2.74**	**1.56**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I (6L+3T)
Electricity
Single phase supply – Three phase supply – Earthing for safety – Lightning arrestor for buildings – Treatment of electric shock.
Unit – II (6L+3T)
Thermal Physics
Thermodynamics – the zeroth law of thermodynamics – Measuring temperature – The Celsius and Fahrenheit scales – Thermal expansion.

Unit – III **(6L+3T)**

Geographic Information System (GIS)

Introduction –Over view of information system – The Four Ms – Entities – Attribute– Spatial data – GIS architecture – Components of GIS – GIS work flow**.**

Unit – IV **(6L+3T)**

Fundamentals of Laser

Laser – spontaneous and stimulated Emission – population inversion – pumping and active system – semiconductor laser – uses of laser.

Unit – V **(6L+3T)**

Solar energy and its application

An introduction to solar energy and its prospects – solar radiation – measurement of solar radiation-solar water heating system- solar cooker–basic photovoltaic system for solar energy conversion.

Text Book:

Study material will be provided

Reference Books:

1. B. Raja Rao - Electricity
   Technical Books Publishers,
   Chennai. Second Edition, 2000.
2. Halliday/Resnick/Walker - Fundamentals of Physics, Sixth edition, John Wiley & Sons (Asia) Pte. Ltd., Singapore, 2001.
3. R.K. Gaur & S.L. Gupta - Engineering Physics
   Seventh Edition
   Dhanpat Rai & Sons
   1682, Nai Sarak,
   Delhi – 110 006.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Electricity	I	Mind Map/Video/ Interactive quizzes, Presentation
Thermal Physics	II	Presentation/Group discussion/ Mind Map/Video/ Interactive quizzes
Geographic Information System	III	Presentation /Mind Map/Video/ Interactive quizzes
Fundamentals of Laser	IV	Display/ Presentation /Mind Map/Video/ Interactive quizzes
Solar energy and its application	V	Display/ Case Study/Presentation /Mind Map/Video

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.

DEPARTMENT OF CHEMISTRY

SEMESTER I

ALLIED COURSE

(Allied course for Physics students)

BDCH1A– FUNDAMENTALS OF CHEMISTRY

(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 04 (03+01)

Total number of hours per semester : 60(45+15)

No. of credits : 04

Course Outcomes:

On successful completion of the course, the learners should be able to

CO[[K21: restate the fundamentals of organic chemistry, carbohydrates, analytical chemistry, metallurgy and dyes.

CO2[K2]: outline the importance and chemistry of carbohydrates, metallurgy and dyes.

CO3[K3]: identify the suitable qualitative and quantitative methods for the analysis and separation of elements and radicals.

CO4[K4]: explain the occurrence of ores and the various steps involved in the extraction of metals of ores.

CO5[K5]: discuss the theory of chromophores and auxochromes on the colour and constitution of dyes, analytical technique, structure of carbohydrates and hybridization.

CO-PO Mapping Table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	1	-	-	-
CO2	3	3	3	1	-	-	-
CO3	3	3	3	3	-	-	-
CO4	9	-	3	1	-	-	-
CO5	9	-	3	3	-	-	-
Weightage of the Course	**27**	**9**	**13**	**9**	**-**	**-**	**-**
Weighted percentage of Course contribution to POs	**2.59**	**1.07**	**2.25**	**3.32**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I (9L+3T)

Fundamentals of Organic Chemistry

a) Introduction-classification of organic compounds, fission of covalent bonds-homolytic fission and heterolytic fission.

b) Types of reactions: substitution reactions, additions reactions, elimination reactions, rearrangement reactions, condensation reactions.

c) Types of reagents – electrophilic reagents and nucleophilic reagents.

d) Free radicals – formation and reactions.

e) Hybridization in organic compounds – ethylene and other alkenes.

Unit II **(9L+3T)**

Carbohydrates

a) Introduction – classification of carbohydrates – monosaccarides - properties and uses of glucose and fructose – Haworth structure – conversion of glucose to fructose and vice versa.

b) Disaccharides – introduction – sucrose – manufacture – properties and uses – structure only- distinction between sucrose, glucose and fructose.

c) Polysaccharides – starch and cellulose – structure only – α-amylose, β-amylose – difference between these two.

Unit III **(9L+3T)**

Analytical Chemistry

a) Qualitative analysis –introduction- analysis of acid radicals, analysis of basic radicals.

b) Quantitative analysis -volumetric analysis – principle, types of titrations.

c) Separation techniques: introduction – extraction – distillation - crystallization.

d) Chromatographic techniques: column chromatography, partition chromatography, thin layer chromatography, gas liquid chromatography, ion exchange chromatography.

Unit IV **(9L+3T)**

Metallurgy

a) Introduction –minerals and ores – various steps involved in metal extraction – grinding – pulverizing – ore dressing – calcinations and roasting – extraction of metal – reduction and smelting – flux – purification or refining methods.

b) Metallurgy of platinum – occurrence – extraction from Mond's process residue – properties - uses – different forms of platinum.

c) Metallurgy of tungsten – occurrence – extraction – properties – uses.

Unit V **(9L+3T)**

Dyes

a) Introduction – classification of dyes according to their chemical constitution – nitro dyes – nitroso dyes – azo dyes – phthalein dyes – triphenylmethane dyes – anthraquinone dyes – indigo dyes – classification of dyes according to the method of their application – direct dyes – mordant dyes – vat dyes – developed dyes – disperse dyes – reactive dyes.

b) Theory of colour and constitution – chromophores – auxochromes.

Reference Books:

1. B.R.Puri & L.R.Sharma and S.Pathania, (2013) Principles of Physical Chemistry , Vishal Publishing Company, New Delhi, 46th edition.
2. P.L.Soni (2001), Inorganic Chemistry, Sultan Chand & Sons, XX edition.
3. P.L Soni & HM Chawla (2007),Organic Chemistry , Sultan Chand & Sons, XXIX edition.

*** Study material will be provided**

TUTORIALS

Topic	Unit	Constructive Alignment – Learning Activity
Hybridization in organic compounds – ethylene and other alkenes.	I	Interactive quizzes
Disaccharides	II	Presentation / video
Column chromatography	III	Video/ presentation
Different forms of platinum	IV	Interactive quizzes
Chromophores & auxochromes.	V	Presentation / Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
PART IV – ABILITY ENHANCEMENT COURSES
VALUE ADDED COURSES
BDES11 - ENVIRONMENTAL STUDIES
SEMESTER I
(For those who have joined in June 2020 and later)

Contact hours per week : 02
Total number of hours per semester : 30
Number of credits : 02

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: recognize the importance of environment and role of individual in its protection.
CO2 [K2]: represent the primary environmental problems and its potential solutions.
CO3 [K3]: utilize the methods for the sustainable use of natural resources.
CO4 [K4]: organize an action plan for sustainable alternatives that integrate science, humanist and social perspectives.
CO5 [K4]: compare the structure and functions of ecosystems in the context of human- environmental interactions.

CO-PO Mapping table (Course Articulation Matrix)

Based on the level of contribution (9-High, 3-Medium, 1-Low)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	-	-	-	1
CO2	3	3	1	-	-	-	-
CO3	3	3	1	1	-	1	1
CO4	3	3	1	3	-	3	1
CO5	3	3	3		-	-	-
Weightage of the course	**15**	**13**	**7**	**4**	**-**	**4**	**3**
Weighted percentage of Course contribution to POs	**1.44**	**1.55**	**1.21**	**1.48**	**0**	**2.8**	**1.89**

UNIT I **(10 hrs)**

Environmental studies: Introduction – uses of environment – importance of environmental studies – scope of environmental studies – environmental studies as a multidisciplinary subject – need for public awareness. Natural resources: types - renewable resources - non –renewable resources – forest resources – water resources – mineral resources – food resources – energy resources – land resources.

Ecosystem: Concept of ecosystem – functions of ecosystem – components of ecosystem – biogeochemical cycles – Biodiversity – *In situ* and *ex situ* conservation of biodiversity – conservation of wild life.

UNIT II **(10 hrs)**

Environmental Pollution: Introduction –pollutants – causes of pollution – types of pollution – effects of pollution – air pollution - water pollution – marine pollution – soil pollution – noise pollution – thermal pollution – radioactive pollution.

Role of IT in environment, sustainable development, Environmental legislations and acts.

Unit III **(10 hrs)**

Solid waste and Disaster management

Solid waste management: Solid waste – types, causes and impact of solid waste – solid waste management – Landfill – Composting – incineration – Recycling – Pyrolysis – Reduction in use – Hazardous waste management – Hazardous waste – impact and strategies.

Disaster management: Disaster and its types – Disaster management – causes, impact, protective steps and case study: Flood, Earthquake, Cyclone, Landslides and Tsunami.

(Study Material will be provided)

Reference Books

1. Arumugam. A., Kumaresan. V (2015), **Environmental Studies**, Saras Publications, Nagercoil, Tamilnadu, India.
2. Eracha Bharucha, (2008), **Text Book of Environmental Studies,** University Press, Hyderabad.
3. Agarwal, S.P (2006), **Environmental Studies**, Narosha Publishing House, Kolkatta.
4. Manoharachary, C. and Jyarama Reddy, P (2006), **Environmental Studies,** B.S. Publication, Hyderabad.

தி ஸ்டாண்டர்டு .ர்பயர்ஒர்க்ஸ் இராஜரத்தினம் மகளிர் கல்லூரி (தன்னாட்சி), சிவகாசி
தமிழ்த்துறை
பகுதி - I -பொதுத்தமிழ்
இளநிலை முதலாம் ஆண்டு - இரண்டாம் பருவம்
BDGT21 – அற இலக்கியமும் தன்முன்னேற்றக் கட்டுரைகளும்
(ஜூன் 2020 ஆண்டில் சேர்ந்தவர்களுக்கும் அதற்குப் பின் சேர்பவர்களுக்கும் உரியது)

ஒரு வாரத்திற்குரிய பாடமணி நேரம் : 06 (5+1)

ஒரு பருவத்திற்குரிய மொத்த பாடமணிநேரம் : 90 (75+15)

தாளின் மதிப்பு : 03

இப்பாடத்தை முழுமையாகக் கற்றபின் மாணவியர் பெறும் திறன்கள்:

CO1[K2]:அற இலக்கியங்களில் இடம்பெற்றுள்ள அறக்கருத்துக்களையும் வாழ்வியல் முன்னேற்றச் சிந்தனைகளையும் எடுத்துரைப்பர்.

CO2[K3]:சொல்லின் வகைகளையும் அதன் இலக்கணத்தையும் இப்பாடத்தோடு தொடர்புடைய இலக்கிய வரலாற்றையும் சான்றுகளுடன் விளக்குவர்.

CO3[K4]:தனிமனித மற்றும் சமூக வாழ்வியலில் மக்கள் பின்பற்ற வேண்டிய அறங்களை அடையாளப்படுத்துவர்.

CO4[K4]:வாழும் போதே சரித்திரம் படைத்தவர்களின் சாதனைகளை வரிசைப்படுத்துவர்.

CO5[K5]:வாழ்வில் முன்னேற்றம் பெறுவதற்கான வழிமுறைகளை மதிப்பிடுவர்.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	-	-	3	-
CO2	3	1	-	-	-	-	-
CO3	3	3	1	-	-	3	-
CO4	3	3	1	-	-	-	-
CO5	3	3	1	-	-	-	-
Weightage of the course	**15**	**13**	**4**	**0**	**0**	**6**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.55**	**0.69**	**0**	**0**	**4.2**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

கூறு 1 : **(15வி + 03ப)**

திருக்குறள்- அறத்துப்பால் - செய்ந்நன்றியறிதல், புறங்கூறாமை

பொருட்பால் - காலமறிதல், மடியின்மை

நாலடியார் - செல்வம்நிலையாமை (1-3)

இளமைநிலையாமை (11-13)

யாக்கைநிலையாமை(21-23)

பெரியோரைப்பிழையாமை(161-163)

நான்மணிக்கடிகை - 6, 11, 18, 22, 79 பாடல்கள்

இன்னாநாற்பது - 3, 8, 21, 33, 39 பாடல்கள்

இனியவைநாற்பது - 2, 17, 21, 22, 15 பாடல்கள்

கூறு 2 : **(15வி + 03ப)**

திரிகடுகம் - 10, 12, 58, 80, 96 பாடல்கள்

ஆசாரக்கோவை - 1,4,16,20,25,30,56,73,74,76,95,96 பாடல்கள்

பழமொழிநானூறு - அவையறிதல் (18,19,20)

கருமம்முடித்தல் (163, 168, 177)

சிறுபஞ்சமூலம்- 7, 9, 11, 37, 41 பாடல்கள்

முதுமொழிக்காஞ்சி-இல்லைப்பத்து.

ஏலாதி - 6, 7, 39, 63, 74 பாடல்கள்

கூறு 3: **(15வி + 03ப)**

வாழும்போதேவானைத்தொடு - (1 - 9 தலைப்புகள்)

கூறு 4: **(15வி + 03ப)**

வாழும்போதேவானைத்தொடு - (10 - 18 தலைப்புகள்)

கூறு 5: **(15வி + 03ப)**

இலக்கணமும் இலக்கியவரலாறும்

சொல்லிலக்கணம் :நான்குவகைத்தமிழ்ச்சொற்கள்

(பெயர், வினை, இடை, உரிச்சொற்கள்)

இலக்கியவரலாறு: பாடப்பகுதியோடுதொடர்புடையஇலக்கியவரலாறு

பாடநூல்கள் :

1. தமிழ்த்துறைப் பதிப்புக்குழு - செய்யுட்கொத்து,
தமிழ்த்துறை வெளியீடு,
எஸ்.எ.ட்.ப்.ஆர்மகளிர்கல்லூரி(தன்னாட்சி)
2020.

2. பேரா. க. இராமச்சந்திரன் - வாழும்போதே வானைத்தொடு,
நியூசெஞ்சுரி புத்தக நிலையம்,
சென்னை,
2013.

பார்வைநூல்கள் :

1. சுப்பிரமணியன், ஆர்.எ. - வாழும் நெறி,
ஸ்ரீசெந்தில் பதிப்பகம்,
சென்னை,
1996.
2. சிதம்பரனார். சாமி - பதினெண்கீழ்க்கணக்கும் தமிழர் வாழ்வும்,
அறிவுப் பதிப்பகம்,
சென்னை,
2003.
3. பேரா.ப.முருகன் - திருக்குறள் திறவுகோல்,
நியூசெஞ்சுரி புத்தக நிலையம்,
சென்னை,
2007.

Tutorials : (பயிற்சி)

Topic	Unit	Constructive Alignment – Learning Activity
நாலடியாரில் நிலையாமை	I	Group Discussion
ஆசாரக்கோவையில் ஒழுக்கங்கள்	II	Mindmap
வாழும்போதே வானைத்தொடு	III	Group Discussion
வாழும்போதே வானைத்தொடு	IV	Presentation
நால்வகைச் சொற்கள்	V	Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTER II
PART – I – HINDI LANGUAGE COURSE
BDGH21 - HINDI LANGUAGE COURSE- II
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the significant contributions of the writers and the basics of grammar in writings
CO2[K2]: explain the renowned literary pieces, describe tourist spots and the methods to write letters
CO3[K3]: identify the techniques and writing style of writers
CO4 [K4]: analyse the literary elements in the works of writers
CO5[K5]: appraise the works of writers

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	0	0	3	0
CO2	3	1	0	0	0	0	0
CO3	3	3	1	0	0	3	0
CO4	3	3	1	0	0	0	0
CO5	3	3	1	0	0	0	0
Weight age of the course	**15**	**13**	**4**	**0**	**0**	**6**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.55**	**0.69**	**0**	**0**	**4.2**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit- I: Poetry (15L+5T)

Ancient Poets :SurDas - 1- 4 Pad, Kabirdas - 1, 2 Pad
Modern Poets :JaishankarPrasad - 1, MahadeviVarma -1, 2,
Sivamangalasingh Suman - 1, Ramdhari Singh Dhinakar -1,
SumitranandanPanth -1.

Unit- II: Drama (15L)

Jaishankar Prasad- *Skandagupta*

Unit- III: Grammar **(15L)**

Verb, Adverb, Prepositions and Conjunction- Definition and main divisions only.
Proverbs

Unit- IV: Letter Writing **(15L+5T)**

Topics: 1. Applying for a post
2. Ordering Books
3. Applying for loan from a bank
4. Informing change of address to the Post Master
5. Introduction letter to a Friend
6. Congratulation letter to a Friend

Unit- V: Tourism: The following Tourist Spots only **(15L+5T)**

Meenakshi Amman Temple, Rameshwaram Temple, Mahabalipuram, Brahadeeswarar Temple, Kanyakumari, Tajmahal, Konark Temple, Ajanta-Ellora, Kashmir, Jaipur

Reference Books:

Chandramohan, K.M. *Hindi Vatyan.* Madurai: Friends Academy, 2009.

Kavya Kusum-3. Chennai: D.B.H.P.Sabha, 2009.

Ramdev. *Vyakaran Pradeep*. Allahabad:HindiBhavan, 2009.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Poetry	I	Interactive Quiz
Letter Writing	IV	Exercise
Tourism	V	Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTERII
PART – I – FRENCH LANGUAGE COURSE
BDGF21 - FRENCH LANGUAGE COURSE- II
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the basic elements of grammar in French
CO2 [K2]: explain the grammatical concept
CO3 [K3]: use grammar in framing questions in French
CO4 [K4]: analyse the importance of French in day to day life
CO5 [K5]: assess the usage of French grammar in everyday life

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	0	0	3	0
CO2	3	1	0	0	0	0	0
CO3	3	3	1	0	0	3	0
CO4	3	3	1	0	0	0	0
CO5	3	3	1	0	0	0	0
Weight age of the course	**15**	**13**	**4**	**0**	**0**	**6**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.55**	**0.69**	**0**	**0**	**4.2**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit - I **(15L+5T)**
1. Les pronomscomplémentsdirectes
2. Les pronomscomplémentsindirectes

Unit - II **(15L+5T)**
1. L'imparfait
2. faire + verbe à l' infinitif
3. usage of qui , que , où1. faire + verbe à l' infinitif
4. usage of qui , que , où

Unit - III **(15L+5T)**

1. Le futur
2. Le passé récent
3. Le Futurproche
4.Le Présentprogressif

Unit -IV **(15L)**

1. Les comparisons

Unit-V **(15L)**

1. Les adverbes
2. Les pronoms Y

Text Book: Campus 1 - C.L.E International - Paris, 2002

Jacky Girardet et JaquesPécheur

Unités : 7 to 12

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Les pronoms	I	Exercise
Write sentences using future proche, passe recent and present progressive	II	Presentation
Topic- names of Magazines and Newspapers in France	III	Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/ B.C.A/ B.Com/B.B.A DEGREE PROGRAMME
SEMESTERII
PART II– ENGLISH
BDGE21 –ENGLISH FOR COMMUNICATION- II
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture + Tutorial) : 90(75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the content through the study of language and literature
CO2 [K2]: comprehend and respond to passages, situations and texts
CO3 [K3]: apply appropriate vocabulary and construct ideas
CO4 [K4]: analyze the prescribed literary pieces
CO5 [K5]: develop grammatical structures accurately and appraise literature

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	0	1	1	1	0
CO2	1	3	0	3	1	0	1
CO3	3	3	1	3	1	0	1
CO4	3	3	1	3	0	3	0
CO5	3	3	1	3	0	3	1
Weightage of the course	**11**	**13**	**3**	**13**	**3**	**7**	**3**
Weighted percentage of Course contribution to POs	**1.05**	**1.55**	**0.52**	**4.8**	**3.49**	**4.9**	**1.89**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I: Listening and Speaking (13L+5T)
Inviting People
Offering Help
Likes & Dislikes
Instructions
Mini Presentation

Unit II: Reading (18L)
Reading to interpret visual information
Reading for gist and specific information

Unit III Writing **(18L)**

Writing to produce a piece of business correspondence in response to input: report, letter writing, memos

Unit IV: Grammar and English Usage **(13L+5T)**

Modals

Tenses

Words often confused

Vocabulary : 30 Phrasal Verbs (1-30)

Unit V Language through Literature **(13L+5T)**

Poetry

John Keats - "Ode on a Grecian Urn"

W. B.Yeats - "A Prayer for my Daughter"

W.H.Auden - "O! What is that Sound"

Prose

R.K. Narayan - "Headache"

S. M. Gavaskar - "Kapil Dev"

J. Bronowski - "The Dilemma of the Scientist"

Reference Books:

Augustine, A.E. and K.V.Joseph. *Macmillan Grammar: A Handbook.* New Delhi: Macmillan India Ltd., 2007. Print.

Amin, Mohamed.A.K. *Wings of Poesy.* Chennai: NCHB, 2006. Print.

Natarajan. K.*Enlightening English Prose,* Chennai: NCHB, 2012. Print.

Reading Cards, CIEFL, Project English 400 (MHRD), Orient Longman Publications,1992. Print.

Syamala, V. *Effective English Communication for You.* Chennai: Emerald Publishers, 2002. Print

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Listening and Speaking	I	Orell Software in Language Lab & Presentation
Grammar and English Usage	IV	Interactive Quiz& Gamification
Language through Literature Poetry Prose	V	Group Discussion, Video/Film & Debate

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER II
PART – III - MAJOR COURSE
BDPH21 - OPTICS
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 05 (04 + 01)
Total number of hours per semester(Lecture hour + Tutorial): 75 (60 + 15)
Total Number of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: summarize the basic concepts and principles of optics.
CO2[K2]: describe various optical parameters, aberrations, optical phenomena, optical theories and optical devices
CO3[K3]: solve problems in optics by selecting appropriate equations
CO4[K4]: analyse various optical parameters, aberrations, dispersion and diffraction
CO5[K5]: evaluate the conditions and ideas to produce desired images through optical devices

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	0	0	0
CO2	9	3	3	1	0	0	0
CO3	9	9	3	1	0	0	0
CO4	9	9	3	1	0	0	0
CO5	9	9	3	1	0	0	0
Weightage of the course	**39**	**33**	**15**	**5**	**0**	**0**	**0**
Weighted percentage of Course contribution to POs	**3.74**	**3.94**	**2.6**	**1.85**	**0**	**0**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit – I
Optical System and Cardinal Points (12L+3T)

Introduction – cardinal points – construction of the image using cardinal points – Newton's formula – Relationship between f_1 and f_2 and μ_1 and μ_2 – Gaussian formula – the three magnifications and their interrelationships – Nodal slide – cardinal points of coaxial system of two thins lenses.

Unit – II

Aberrations-I **(12L+3T)**

Aberrations – First and Third order theory – Spherical aberration– Reducing spherical aberrations–Coma – Aplanatic points– Astigmatism – curvature of the field – distortion

Unit – III

Aberrations-II **(12L+3T)**

Chromatic aberration – chromatic aberration in a lens – circle of least chromatic abberation – Achromatic lenses – conditions for achromatism of two thin lenses placed incontact and a finite distance – oil immersion objective of high power microscope- Achromatism of telescope objective – Achromatism of a camera lens- Corrector plates.

Unit – IV

Dispersion **(12L+3T)**

Dispersion by a prism –Refraction through a prism – Angular dispersion - Dispersive power – Angular and Chromatic dispersions – Achromatic combination of prisms - Deviation without dispersion – Dispersion without deviation – Direct vision Spectroscope.

Unit – V

Fraunhoffer Diffraction **(12L+3T)**

Fraunhoffer diffraction at a single slit – Intensity distribution in diffraction pattern to a single slit – Fraunhoffer diffraction at a single slit (Calculus method)– Plane diffraction grating – Theory of plane transmission grating – Width of principal maxima – Oblique incidence – Absent spectra with a diffraction grating – Overlapping of spectral lines.

Text Book:

Dr.N. Subrahmanyam and Brijlal

Dr.M.N.Avadhanulu – A Text book of Optics
S. Chand and Company Ltd, NewDelhi
25th Revised Edition, 2012, Reprint 2015

Reference Books:

1. Fundamentals of Optics – Francis A.Jenkins, Harvey E.White, Mc Graw Hill Book Company, Fourth Edition.
2. Optics and Spectroscopy – R.Murugeshan, KiruthigaSivaprasath, S.Chand and Company Ltd, Seventh Revised Edition, 2010.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Cardinal points	I	Mind Map/Video/ quiz
Aberrations	II	Scrap book/ Presentation
Achromatism	III	Presentation / Video
Dispersion	IV	Model display /Presentation /Mind Map/Video
Fraunhoffer Diffraction	V	Presentation /Mind Map/Video

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER I & II
PART – III - MAJOR COURSE
BDPH2L – PROPERTIES OF MATTER LAB
(Any 16 experiments)
(For those who have joined in June 2020 and later)

Contact hours per week : 03
Total number of hours per semester : 45
Total number of Credits : 04

Course Outcomes (CO):

On successful completion of the course, the learners should be able to
CO1[K2]: explain the physical concepts underlying the experiments
CO2[K3]: construct the experimental set up
CO3[K3]: perform experiments applying thermal and optical properties
CO4[K4]: analyze the data mathematically and graphically
CO5[K5]: evaluate the experimental results with laboratory ethics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	0	1	1	1
CO2	3	3	3	0	1	1	1
CO3	9	9	3	0	1	1	1
CO4	9	9	9	1	1	1	1
CO5	9	9	9	1	1	1	1
Weightage of the course	**31**	**30**	**24**	**2**	**5**	**5**	**5**
Weighted percentage of Course contribution to POs	**2.97**	**3.58**	**4.16**	**0.74**	**5.81**	**3.5**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

List of experiments

1. Finding the thickness of a thin object using microscope
2. Error Analysis – in the measurement of thickness of objects using Vernier calipers and screw gauge
3. Uniform Bending – Optic lever and telescope
4. Uniform Bending – Pin and Microscope
5. Non Uniform Bending – Optic lever and telescope

6. Non Uniform Bending – Pin and Microscope
7. Surface tension by capillary rise
8. Determination of contact angle of different liquids
9. Compound pendulum
10. Torsional Pendulum
11. Lee's disc method
12. Newton's law of cooling
13. Dispersive power of a prism using spectrometer
14. Determination of refractive index of the prism using spectrometer
15. Grating – Determination of wave length
16. Finding cardinal points of a lens system (in contact)
17. Finding cardinal points of a lens system (out of contact)
18. Computer oriented practical – Drawing graph for any one experiment using EXCEL
19. Laser experiment – Determination of Particle Size
20. Laser experiment – Determination of Radius of the Circular Aperture
21. Laser experiment – Determination of width of the rectangular Aperture
22. Laser experiment – Determination of wavelength of light

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF CHEMISTRY
SEMESTER II
ALLIED COURSE
(Allied course for Physics students)
BDCH2A– PHYSICAL AND INDUSTRIAL CHEMISTRY
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 04 (03+01)
Total number of hours per semester : 60(45+15)
No. of credits : 04

Course Outcomes:
On successful completion of the course, the learners should be able to
CO1[K2]:restate the basic concepts of photochemistry, industrial and water chemistry, amino acids, proteins, chemical kinetics and catalysis.
CO2[K2]: explain the chemistry of fuel gases, fertilizers, silicones, water and catalysis.
CO3[K3]:classify photophysical process, fuel gases, fertilizers, silicones, hardness of water, amino acids, proteins, nucleic acids and catalysis.
CO4[K4]:examine the biological importance of amino acids, proteins, peptides, nucleic acids, photochemistry.
CO5[K5]:discuss the order of the reactions, mechanism and application of catalyst.

CO-PO Mapping Table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	-	3	-	-	-
CO2	3	3	-	1	-	-	-
CO3	9	-	3	3	-	-	-
CO4	9	3	3	3	-	-	-
CO5	9	-	3	1	-	-	-
Weightage of the Course	**33**	**9**	**9**	**11**	**-**	**-**	**-**
Weighted percentage of Course contribution to POs	**3.16**	**1.07**	**1.56**	**4.06**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I (9L+3T)
Photochemistry
Introduction - laws of photochemistry: Grotthus Draper law, Stark Einstein law of photochemical equivalence - quantum efficiency - the hydrogen-chlorine reaction – photosensitation – photosynthesis – fluorescence – phosphorescence - chemiluminescence.

Unit II **(9L+3T)**

Industrial Chemistry

a) Fuel gases – introduction – requisites of a good fuel- types of a fuel – types of fuel gas: natural gas, water gas, semi water gas, carburatted water gas, producer gas, oil gases, liquefied petroleum gas, compressed natural gas, bio gas-gobar gas.

b) Fertilizers – introduction - ammonium sulphate, urea, superphosphate of lime, triple super phosphate, potassium nitrate.

c) Silicones – introduction – preparation - properties and uses.

Unit III **(9L+3T)**

Water chemistry

Introduction - types of hardness - temporary hardness and permanent hardness - estimation of hardness of water – EDTA method - softening of hard water – zeolite process, demineralization process - reverse osmosis - domestic water treatment - biochemical oxygen demand - chemical oxygen demand - comparison of biochemical oxygen demand and chemical oxygen demand.

Unit IV **(9L+3T)**

Amino acids and proteins

a) Amino acids – introduction – types – preparation - properties of various amino acids.

b) Peptides – introduction - synthesis – carbobenzoxy method, diketopiperazine method.

c) Proteins – introduction – classification – characteristics - biological functions and structure.

d) Nucleic acids –introduction – nucleosides – nucleotides - structure of DNA - difference between DNA and RNA.

Unit V **(9L+3T)**

Chemical kinetics and catalysis

a) Chemical kinetics – introduction,- order and molecularity of reaction –first and second order reactions - pseudo unimolecular reactions - zero order reactions - determination of order of reactions : time for half change method, Ostwald's dilution method.

b) Catalysis – types of catalysis – homogeneous and heterogeneous - characteristic of catalytic reactions – mechanism of catalytic action – the intermediate compound formation theory – the adsorption theory – industrial applications.

Reference Books:

1. B.R.Puri & L.R.Sharma and S.Pathania, (2013) Principles of Physical Chemistry , Vishal Publishing Company, New Delhi, 46th edition.
2. P.L.Soni(2001), Inorganic Chemistry, Sultan Chand & Sons, XX edition.
3. P.L Soni & HM Chawla(2007),Organic Chemistry , Sultan Chand & Sons, XXIX edition.

*** Study material will be provided**

TUTORIALS

Topic	Unit	Constructive Alignment – Learning Activity
Chemiluminescence.	I	Interactive quizzes
Bio gas	II	Presentation / video
Reverse osmosis	III	Video/ presentation
Difference between DNA and RNA.	IV	Interactive quizzes
Ostwald's dilution method	V	Presentation / Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF CHEMISTRY
SEMESTER I & II
ALLIED PRACTICALS
(Allied Practical for Physics students)
BDCH2AL - VOLUMETRIC ESTIMATION
(For those who have joined in June 2020 and later)

Contact hours per week : 02
Total number of hours per semester : 30
No. of credits : 02

Course Outcomes (CO):

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

CO1[K2]: summarise the procedure for different types of volumetric analysis
CO2[K3]: apply the law of volumetric analysis for determining the strength of analyte
CO3[K4]:apply the knowledge on concentration units to calculate the amount of analyte present in the whole of the given solution
CO4[K4]: demonstrate the analysis of hardness of water
CO5[K5]: follow the laboratory safety measures and ethics to use acids, bases and other chemicals, record note books and avoid malpractices, data manipulation and copying

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	0	-	-	3	-
CO2	9	9	3	-	-	9	9
CO3	9	9	0	-	-	9	9
CO4	9	3	9	-	-	9	-
CO5	9	3	9	-	-	9	9
Weight age of the course	**45**	**33**	**21**	**-**	**-**	**39**	**27**
Weighted percentage of Course contribution to POs	**4.31**	**3.94**	**3.64**	**0**	**0**	**27.27**	**16.98**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

1) Acidimetry and alkalimetry

1. Estimation of oxalic acid
2. Estimation of Sulphuric acid
3. Estimation of Hydrocholoric acid
4. Estimation of sodium carbonate
5. Estimation of NaOH/KOH

2) Redox titrations:

i) Permanganometry

6. Estimation of ferrous ion
7. Estimation of Ferrous Ammonium Sulphate
8. Estimation of Ferrous sulphate
9. Estimation of oxalic acid.

ii) Dichrometry

10. Estimation of potassium dichromate – internal indicator.
11. Estimation of ferrous ion– internal indicator.
12. Estimation of ferric ion by reduction with stannous chloride – external indicator.

iii) Iodometry

13. Estimation of potassium permanganate.
14. Estimation of cuprous ion.
15. Estimation of potassium dichromate.

3) Complexometry :

16. Estimation of zinc using EDTA.
17. Estimation of Magnesium using EDTA.

4) Estimation of hardness of water

Textbook:

1. J. Bassett et-al., (2001), Vogel's Textbook of quantitative Inorganic Analysis, ELBS, VII edition.

No of sessions – 30

S.NO	NATURE OF WORK	NO OF SESSIONS ALLOTTED
1	Demonstration	4
2	Regular Practical class	18
3	Repetition	4
3	Revision Exam	2
4	Model Exam	2
Total		**30**

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
Common to All UG Degree Programmes
SEMESTER II
PART IV – ABILITY ENHANCEMENT COURSES
VALUE ADDED COURSE
BDVG21-VALUE EDUCATION & GENDER STUDIES
(For those who joined in June 2020 and later)

Contact hours per week : 02
Total number of hours per semester : 30
Number of credits : 02

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1 [K1]: recall the basic concepts of various categories of value education and gender studies
CO2 [K2]:outline the principles of personal, family, professional and societal values
CO3 [K2]: explain strategies that can attain ethical-moral values, gender variations and gender equality
CO4 [K4]: examine the multifaceted dimensions of women's role in the society with moral values and ethics
CO5 [K4]:analyze the elements of gender studies associated with values for peaceful and contented life

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	0	1	3	1	1
CO2	1	3	0	1	3	3	1
CO3	3	3	0	3	3	3	1
CO4	3	1	0	3	3	3	3
CO5	3	3	0	3	3	3	3
Weight age of the course	**13**	**13**	**0**	**11**	**15**	**13**	**9**
Weighted percentage of Course contribution to POs	**1.25**	**1.55**	**0**	**4.06**	**17.44**	**9.09**	**5.66**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit I : (10 hrs)

Value – Ethics – Morality-Categorization of Values - Personal Values & Family Values - Societal Values - Professional Ethics.

Unit II : **(10 hrs)**

Gender Studies - Adolescence - Sex and Gender –Gender Equality.

Unit III : **(10 hrs)**

Women and Health – Women and Law – Women and Employment – Discover Peace and Contentment.

- **Study Materials will be provided.**

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.

PART IV – ABILITY ENHANCEMENT COURSE - SKILL BASED COURSE

COMPUTER LITERACY

SEMESTER II

BDCL23 – INTRODUCTION TO COMPUTERS & MS OFFICE

(For Tamil, English, History, B. Com (General), B.Com (PA), Mathematics, Mathematics (CA), Physics, Chemistry, Botany, Microbiology, Nutrition and Dietetics and Costume Design and Fashion)

(For those who have joined in June 2020 and later)

Contact hours per week	**:**	**02**
Total number of hours per semester	**:**	**30**
Number of Credits	**:**	**02**

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1 [K2]: explain the components of computer and basics of office automation software

CO2 [K2]: summarize the features of windows operating system and PC software

CO3 [K2]: demonstrate the working of windows operating system

CO4 [K3]: utilize the word features for document creation

CO5 [K4]: analyze the commands for simple visual presentations

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	-	-	-
CO2	3	1	-	3	-	-	-
CO3	3	3	-	3	-	-	3
CO4	3	3	-	3	-	-	3
CO5	1	3	-	3	-	-	3
Weightage of the course	**13**	**10**	**-**	**12**	**-**	**-**	**9**
Weighted percentage of Course contribution to POs	**1.25**	**1.19**	**0**	**4.43**	**0**	**0**	**5.66**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I **(10 hrs)**

Introduction to Computers: Introduction – Types of Computers – Characteristics of Computers. **Anatomy of a Digital Computer:** Functions and Components of a Computer – Central Processing Unit – Memory.

Windows 7: Start Windows7 – Windows 7 Screen - Restart Windows 7 – Shutdown Windows7–Start a program–Understand program window–Maximize a window – Minimize a window – Moving a window – Resizing a window – Switch between windows - Changing Desktop Background – Set the Screen Saver – Apply Theme—My Computer-Viewing the hard disk space–Disk cleanup.

Unit II **(10 hrs)**

MS-WORD 2010: Introduction – Starting Word – The Word Window – Operations in Text – Table - Printing a document.

Unit III **(10 hrs)**

MS-POWERPOINT 2010: Features of PowerPoint – PowerPoint Window – Operations in Presentation – Animation

Text Books:

1. Alexis Leon & Mathews Leon (1999), "Introduction to Computers", Leon Tech World.

2. Biswaroop Roy Chowdhury and Davinder Singh Minhas (2016), "Dynamic Memory Computer Course Step by Step Guide", Diamond Pocket Books (P) Ltd., NewDelhi.

List of Commands

WINDOWS 7 Operating System

1. Start Windows
2. Moving, Resizing, Maximizing, Minimizing and Closing a Window
3. Shut Down & Restarting Windows
4. Changing Desktop Background, Screen Saver, Screen Appearance, Screen Resolution, Date and Time, Desktop Theme
5. My Computer
6. Viewing hard disk space and disk cleanup

MS Word

1. Starting Word
2. Entering, Selecting Text

3. Saving, Closing, Exiting, Opening a Document
4. Inserting, Deleting, Moving, Copying, Finding, Replacing, Date and Time, Symbols.
5. Changing the Font, Size, Bold, Italic, Underline, Color, Alignment, Case, Appearance, Line Spacing
6. Creating a Bullet or Number List
7. Inserting break, Page Number, Header &Footer
8. Adding Word art, Picture & ClipArt
9. Inserting Auto shapes &screenshot
10. Creating a newspaper column
11. Printing a Document
12. **Create a table and do the following operations**
    i. Enter Text
    ii. Delete a Table
    iii. Adding & Deleting a Row, Column
    iv. Moving, Resizing a Table
    v. Selecting, Combining & Splitting Cells in a Table
    vi. Aligning the Text in Cell
    vii. Adding Shades to Cells
    viii. Applying Table Styles

MS PowerPoint

Create a Presentation and do the following operations

1. Starting PowerPoint
2. Creating a new presentation, Title Slide
3. Saving, Closing & Opening a presentation
4. Changing Slide layout
5. Changing PowerPoint Views
6. Selecting & Deleting Text
7. Changing the Font, Size, Style, Alignment, Color of Text
8. Changing the Color Scheme, Background Color of Slides
9. Adding a Picture, ClipArt Image
10. Animation

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
UG PROGRAMMES
SEMESTER I & II
PART V

BDSA2 – SOCIAL AWARENESS PROGRAMME & PHYSICAL EDUCATION

(For those who have joined in June 2020 and later)

Number of credits : 1

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K3]: identify their interest, leadership skills and undertake challenges.
CO2[K3]: adapt to work in team and communicate effectively with the society
CO3[K3]: instill a sense of responsibility on environmental issues and conservation of nature
CO4[K6]: develop the habit of creating awareness on health for society
CO5[K6]: build up a positive image of women with self-confidence and self-awareness.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	-	-	3	3	1	3
CO2	-	-	-	3	3	1	3
CO3	-	-	-	3	3	1	1
CO4	-	-	-	3	3	1	1
CO5	-	-	-	1	1	1	1
Weightage of the course	**-**	**-**	**-**	**13**	**13**	**5**	**9**
Weighted percentage of course contribution to POs	**0**	**0**	**0**	**4.8**	**15.12**	**3.5**	**5.66**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Course Details:

BDSA2SSL	• Social Service League	60 Hours
BDSA2YRC	• Youth Red Cross	
BDSA2RRC	• Red Ribbon Club	
BDSA2ENC	• Environment Club	
BDSA2CCC	• Citizen Consumer Club	
BDSA2EXT	• Extension Activities cell	
BDSA2PYE	• Physical Education	
BDSA2NCC	• National Cadet Corps	80 Hours
BDSA2NSS	• National Service Scheme	120 Hours

Rules:

- During the first semester, the first UG students have to enrol in any one of the Part V Course.
- This course is conducted on Mondays and Tuesdays between 3.15 and 5.15 PM in each semester
- Marks are given based on their attendance
- Student should hold a minimum attendance of 75% for each Semester.
- In case of shortage of attendance, the student has to complete the required attendance before the completion of the U. G. Course, the failure of which the students can appear for the End semester examinations but become ineligible to get the degree

தி ஸ்டாண்டர்டு ∴பயர்ஒர்க்ஸ் இராஜரத்தினம் மகளிர் கல்லூரி (தன்னாட்சி), சிவகாசி

தமிழ்த்துறை

பகுதி I - பொதுத்தமிழ்

இளநிலை இரண்டாம் ஆண்டு - மூன்றாம்பருவம்

BDGT31 - சமய இலக்கியமும் நாடகமும்

(ஜூன் 2020ஆம் ஆண்டில் சேர்ந்தவர்களுக்கும் அதற்குப்பின் சேர்பவர்களுக்கும் உரியது)

ஒரு வாரத்திற்குரிய பாடமணிநேரம் : 06 (5+1)

ஒரு பருவத்திற்குரிய மொத்த பாட மணிநேரம : 90 (75+15)

தாளின் மதிப்பு : 03

இப்பாடத்தை முழுமையாகக் கற்றபின் மாணவியர் பெறும் திறன்கள் :

CO1[K2]: சமய இலக்கியங்கள் மற்றும் நாடகங்கள் புலப்படுத்தும் கருத்துக்களையும் செய்யுள் யாப்பு மரபுகளையும் எடுத்துரைப்பர்.

CO2[K3]: இறையடியார்கள் இறைவனைப் போற்றும் மரபினை அடையாளப்படுத்துவர்.

CO3[K4]: சமய அடியவர்கள் இறைவனை வேண்டும் மரபினையும் அவர்களது இலக்கியங்களில் இடம்பெற்றுள்ள புராணக் கருத்துக்களையும் ஆய்ந்தறிவர்.

CO4[K4]: சமய இலக்கியங்கள் உணர்த்தும் இறை மற்றும் தத்துவச் சிந்தனைகளை ஆராய்வர்.

CO5[K5]: சமய இலக்கியங்கள் மற்றும் நாடகங்களின் பொருண்மைகளை மதிப்பிடுவர்.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	-	1	-	3	-
CO2	3	-	3	1	-	-	-
CO3	3	3	3	1	-	-	-
CO4	3	3	3	1	-	-	-
CO5	3	-	-	1	-	-	-
Weightage of the course	**15**	**9**	**9**	**5**	**-**	**3**	**-**
Weighted percentage of course contribution to POs	**1.44**	**1.07**	**1.56**	**1.85**	**0**	**2.1**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

கூறு 1: **(15வி + 03ப)**

திருஞானசம்பந்தர்-தென்குடித்திட்டை (முன்னை……1-10 பாடல்கள்)

சுந்தரர் -திருமழப்பாடி பதிகம் (பொன்னார் மேனியனே….1-10 பாடல்கள்),

மாணிக்கவாசகர்-திருவாசகம் - அதிசயப்பத்து

திருமங்கையாழ்வார் - எட்டாம்பத்து - ஆறாம் திருமொழி (10 பாடல்கள்)

நம்மாழ்வார் - இரண்டாம்பத்து - ஏழாம் திருவாய்மொழி (10 பாடல்கள்)

கூறு 2: **(15வி + 03ப)**

பாம்பாட்டிச் சித்தர் - பொருளாசைவிலக்கல் (10 பாடல்கள்)
தேம்பாவணி - நகரப் படலம் (முதல் 15 பாடல்கள்)
மு.மேத்தா - நாயகம் ஒரு காவியம் - கொள்கைப்பயணம் முதல் அண்ணலின் முழக்கம் வரை

கூறு 3: **(15வி + 03ப)**

சேரன் செல்வி (நூல் முழுமையும்)

கூறு 4: **(15வி + 03ப)**

புராண நாடகங்கள் - நாடக எண் - 1,2,3

கூறு 5: **(15வி + 03ப)**

யாப்பு இலக்கணம் - வெண்பா, ஆசிரியப்பா, வஞ்சிப்பா – இலக்கணமும் வகைகளும்
கலிப்பா, மருட்பா - இலக்கணம் மட்டும்
இலக்கியவரலாறு - பாடப்பகுதியோடு தொடர்புடைய இலக்கிய வரலாறு

பாடநூல்கள் :

1. தமிழ்த்துறைப் பதிப்புக்குழு - இலக்கியக் கொத்து, தமிழ்த்துறைவெளியீடு, நியூசெஞ்சுரிபுக்ஹவுஸ், சென்னை, 2018.
2. வ.த.ராமசுப்பிரமணியம் - சேரன் செல்வி, பாரிபுத்தகநிலையம், சென்னை,2012
3. ஜெயந்தி நாகராஜன் - புராண நாடகங்கள், தாமரை பப்ளிகேஷன்ஸ், சென்னை,2011.

பார்வை நூல்கள் :

1. ப.அருணாசலம் - பக்தி இலக்கியம், பாரி புத்தகப்பண்ணை, சென்னை - 5. 1983.
2. மயிலை.சீனி.வேங்கடசாமி - சமயம் வளர்த்த தமிழ், கழக வெளியீடு, சென்னை – 18,1959

Tutorials : (பயிற்சி)

Topic	Unit	Constructive Alignment – Learning Activity
பக்தி நிலை	I	Mindmap
நாயகத்தின் கொள்கைப்பயணம்	II	Group Discussions
சேரன் செல்வி	III	Mindmap
அடியார் வரலாறு	IV	Mindmap
பா வகைகள்	V	Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTER III
PART – I – HINDI LANGUAGE COURSE
BDGH31 - HINDI LANGUAGE COURSE- III
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the significant contributions of the writers and poetics
CO2 [K2]: explain the renowned literary pieces and describe factual reports for everyday life
CO3 [K3]: identify the techniques and writing style of writers
CO4 [K4]: analyse the literary elements in the works of writers
CO5 [K5]: appraise the works of writers

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	0	1	0	3	0
CO2	3	0	3	1	0	0	0
CO3	3	3	3	1	0	0	0
CO4	3	3	3	1	0	0	0
CO5	3	0	0	1	0	0	0
Weight age of the course	**15**	**9**	**9**	**5**	**0**	**3**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.07**	**1.56**	**1.85**	**0**	**2.1**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit- I: Poetry (15L+5T)

Ancient Poet :Tulasidas - KevatPrasang.
Modern Poets :Ayodhya Singh upadyay Hari Oudh - 1, 2
Suryakant TripatiNirala -1, 2.

Unit- II: Fiction **(15L+5T)**

Prem Chand- *Gaban*

Unit- III: Short Stories **(15L+5T)**

KahaniManjari

Unit- IV: Journalism **(15L)**

Reporting a meeting, accident, public inconveniences, match, natural calamity, crime, election &Health programme

Unit- V: Poetics **(15L)**

a) Ras :Shrinagar, Veer, Karun&Hasya

b)Chand : Doha, Soratha, Baravati, Charpai, Rola, Hangeeti Ka, Indravajra and Manda Kranta.

c)Alankar: Anupras, Slesh, Yamak ,Vakrokti, Upama,Utpreksha, Roopak and Virodhabhas.

Reference Books:

KahaniManjari. Chennai : D.B.H.P. Sabha, 2010.

Modi, Purushottam das. *Kavya Kusum – 3*. Varanasi: Vishwa Vidhyalay, PrakashanChowk, 2010.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Poetry	I	Interactive Quiz
Fiction	II	Role Play
Short Stories	III	Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTER III
PART – I – FRENCH LANGUAGE COURSE
BDGF31 - FRENCH LANGUAGE COURSE- III
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the basic elements of grammar in French
CO2 [K2]: explain the grammatical concept, express their feelings and opinions in French
CO3 [K3]: use grammar in framing correct sentences
CO4 [K4]: analyse the importance of French in day to day life
CO5 [K5]: assess the usage of French grammar in everyday life

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	0	1	0	3	0
CO2	3	0	3	1	0	0	0
CO3	3	3	3	1	0	0	0
CO4	3	3	3	1	0	0	0
CO5	3	0	0	1	0	0	0
Weightage of the course	**15**	**9**	**9**	**5**	**0**	**3**	**0**
Weighted percentage of Course contribution to POs	**1.44**	**1.07**	**1.56**	**1.85**	**0**	**2.1**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit- I (15L+5T)
1. Les pronoms personnel compléments
2. Donner votre opinion
3. Exprimer le but , le peur

Unit- II (15L)
1. Le conditionnelprésent

Unit-III **(15L+5T)**

1. Exprimer un souhait
2. Le subjonctifprésent

Unit- IV **(15L+5T)**

1. les adjectifs et les pronomsindéfinis

Unit- V **(15 L)**

1. Les pronomsdémonstratifs
2. Les pronomsinterrogatifs

Text Book: Campus 2 - C.L.E International – Paris, 2002.

Jacky Girardet et JaquesPécheur

Unités : 1 to 6

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Curriculum Vitae preparation	I	Exercise
Speak about the protection of animals	III	Presentation
Writing letter using subjonctif	IV	Exercise

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A/ DEGREE PROGRAMME
SEMESTER III
PART II– ENGLISH
BDGE31 –ENGLISH FOR ENRICHMENT - I
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture + Tutorial) : 90(75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the content through the study of language and literature
CO2 [K2]: comprehend and respond to passages, situations and texts
CO3 [K3]: apply appropriate vocabulary and construct ideas
CO4 [K4]: analyze the prescribed literary pieces
CO5 [K5]: develop grammatical structures accurately and appraise literature

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	0	1	1	1	0
CO2	1	3	0	3	1	0	1
CO3	3	3	1	3	3	0	1
CO4	3	3	1	3	0	3	0
CO5	3	3	3	3	0	3	1
Weightage of the course	**11**	**13**	**5**	**13**	**5**	**7**	**3**
Weighted percentage of Course contribution to POs	**1.05**	**1.55**	**0.87**	**4.8**	**5.81**	**4.9**	**1.89**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit – I: Listening and Speaking (13L+5T)
Conversational Skills
Dialogue Writing
Interview Skills
Group Discussion

Unit – II: Reading and Writing (18L)
Comprehension : 10 Passages
Agenda
Minutes

Paragraph Writing

Unit – III : Grammar and English Usage **(18L)**

Voices

Degree of Comparision

Homonyms, Homophones, Homographs

Idioms and Phrases (A-N)

Language through Literature

Unit – IV : Fiction **(13L+5T)**

Rudyard Kipling - *The Jungle Book*

Unit - V : Short Stories **(13L+5T)**

Oscar Wilde - "The Model Millionaire"

Pearl S.Buck - "The Refugees"

Sir Arthur Conan Doyle - "The Dying Detective"

Reference Books:

Augustine, A.E. and K.V.Joseph. *Macmillan Grammar: A Handbook.* New Delhi: Macmillan India Ltd., 2007.

Farhathullah, T.M. *Communication Skills for Undergraduates*. 1st ed. Chennai: R.B.A. Publications,

Lalitha Natarajan, Sasikala Natesan. *English for Excellence*, Chennai: Anuradha Publications, 2006.

Reading Cards, CIEFL, Project English 400 (MHRD), Orient Longman Publications, 1992.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Listening and Speaking	I	Orell Software in Language Lab & Presentation
Grammar and English Usage	IV	Interactive Quiz & Gamification
Language through Literature Fiction	V	Video

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER III
PART – III - MAJOR COURSE
BDPH31 - ELECTRICITY
(For those who have joined June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 05(04+01)
Total number of hours per semester(Lecture hour + Tutorial): 75(60+15)
Total number of Credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]:describe electric potential, capacitance, electromotive force, direct & alternating current and principle of operation of fuel cell.
CO2[K2]:explain electric potential due to charges & dipole, electrical parameters, DC & AC circuit and types of fuel cell.
CO3[K3]:solve problems related to various electrical circuits and fuel cell.
CO4[K4]:analyze various electrical parameters, capacitor with dielectrics, AC & DC circuits, working mechanism and characteristics of fuel cell.
CO5[K5]:evaluate electrical parameters of various circuits and fuel cell.

CO-PO Mapping table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course (w)	**39**	**33**	**33**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.74**	**3.94**	**5.72**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

Electric Potential: (12L+3T)

Electric Potential Energy – Electric Potential – Calculating the Potential from the field– Potential due to Point Charge – Potential due to an electric dipole - Potential due to a Continuous Charge Distribution - Calculating the field from the Potential

Unit – II (12L+3T)

Capacitance:

The uses of Capacitors – Capacitance – Calculating the Capacitance – Capacitors in

series and parallel - Energy storage in an Electric Field – Capacitor with a Dielectric**.**

Unit – III

Current, Resistance and Circuits: (12L+3T)

Moving Charges and Electric Currents – Electric Current – Current Density – Resistance and Resistivity – Ohm's Law – A microscopic view of Ohm's law – Power in electric Circuits – semiconductors – Superconductors.

Work, Energy and Emf – Calculating the current in a single loop circuit – Other Single loop circuits – Potential differences – RC Circuits.

Unit – IV

Alternating Current Circuits: (12L+3T)

Alternating current- Three separate elements-The single loop RLC circuit- Power in AC circuits – The Transformer.

Unit – V

Fuel Cell: (12L+3T)

Introduction - Principle of operation of fuel cell – Types of fuel cell – Proton exchange Membrane (PEM) fuel cell – Efficiency, Polarisation and power characteristics of PEM – Microbial Fuel Cell (MFC): Electricity generation mechanism in MFC - Working Principles of MFC.

Text Books:

Unit I, Unit II and Unit III

1. Halliday/ Resnick /Walker - Fundamentals of Physics , Sixth edition, Extended JohnWiley & Sons. Inc.

Unit IV

2. Halliday/ Resnick /Krane - Physics – Volume 2 Fifth edition, Reprint 2014 Wiley India Pvt. Ltd.,

Unit V

3. URL:https://www1.eere.energy.gov/hydrogenandfuelcells/tech_validation/pdfs/fcm04r0.pdf
4. URL : http://dx.doi.org/10.1016/B978-0-08-087872-0.00412-1

Study material will be provided for this unit

Reference Books:

1. R.Murugeshan - Electricity and Magnetism, S. Chand & Company LTD, Seventh Revised Edition, Reprint with correction 2008.
2. Sehgal Chopra Sehgal - Electricity and Magnetism, S.Chand & sons, Newdelhi. 5th edition,2002.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Electric Potential	I	Scrap book/ Mind Map/Video/ Interactive quizzes
Capacitance	II	Case Study/Presentation Group discussion/debate
Semiconductors and Superconductors	III	Case Study/Presentation /Mind Map/Video
Alternating Current Circuits	IV	Mini project/Display/ Case Study/Presentation /Mind Map/Video
Fuel cell	V	Mini project/Display/ Case Study/Presentation /Mind Map/Video

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER III
PART – III - MAJOR COURSE
BDPH32 - ELECTROMAGNETISM
(For those who have joined June 2020 and later)

Contact hours per week (Lecture hour+tutorial) :04(03+01)
Total number of hours per semester(Lecture hour+tutorial) :60(45+15)
Total number of Credits : 04
Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: describe the laws and concepts of magnetic fields and properties of magnetic materials.
CO2[K2]: explain the phenomena of electromagnetic oscillations and waves.
CO3[K3]: apply the magnetic phenomena, magnetic material properties of electromagnetic oscillations and waves to solve problems.
CO4[K4]: analyse the magnetic effect in case of current carrying wires, induction applied to EM circuits and waves.
CO5[K5]: criticize the basic concepts and laws of electromagnetism.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	0	0	0	0
CO2	9	3	3	0	0	0	0
CO3	9	9	3	0	0	0	0
CO4	9	9	3	0	0	0	0
CO5	9	9	3	0	0	0	1
Weightage of the course	**39**	**33**	**15**	**0**	**0**	**0**	**1**
Weighted percentage of Course contribution to POs	**3.74**	**3.94**	**2.6**	**0**	**0**	**0**	**0.63**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I
The Magnetic Fields: (9L+3T)
Magnetic field- definition of B-Magnetic force on a current carrying wire – Torque on a Current Loop-Magnetic dipole moment.

The Magnetic Fields due to Currents:
Calculating the magnetic field due to current-Force between two Parallel Currents –Ampere's Law- Solenoids and Toroids- Current carrying coil as a Magnetic Dipole.

Unit – II

Induction and Inductance: (9L+3T)

Faradays law of induction–Lenz ‘s law-Inductors and Inductance-Self induction- RL Circuits – Energy stored in a Magnetic Field –Energy density of a Magnetic Field-Mutual Induction.

Unit – III

Magnetism of matter: Maxwell’s Equations: (9L+3T)

Magneticmaterials-Diamagnetism-Paramagnetism-Ferromagnetism-Induced Magnetic Fields-Displacement current-Maxwell’s Equations.

Unit – IV

Electromagnetic Oscillations and Alternating current: (9L+3T)

LC oscillations, Qualitatively-The Electrical-Mechanical analogy–LC oscillations Quantitatively-Damped oscillations in an RLC circuit-Alternating current- Forced Oscillations-The series RLC circuit.

Unit – V

Electromagnetic waves: (9L+3T)

The travelling electromagnetic wave, Qualitatively- The travelling electromagnetic wave, Quantitatively- Energy transport and the Poynting vector-Radiation Pressure-Polarization-Reflection and refraction-Total internal reflection-Polarization by reflection.

Text Book:

Halliday/ Resnick /Walker - Fundamentals of Physics – Extended
Sixth edition-2004,
John Wiley & sons, Inc.,

Reference Books :

1. D.N. Vasudeva - Fundamentals of Magnetism and Electricity
S. Chand and Company Limited
Twelfth Revised Edition, 1983

2. R.Murugeshan - Electricity and Magnetism
S. Chand & Company LTD
Seventh Revised Edition
Reprint with correction 2008.

3. Paul Lorrain and
Dale R.Corson - ElectromagneticFields and waves
CBS Publishers & Distributors (NewDelhi)
II Edition, First Indian Edition1986, Reprint 2003

4.Halliday/ Resnick /Krane - Physics – Volume 2
Fifth edition, Reprint 2014
Wiley India Pvt. Ltd.,

Tutoriap
ls:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Solenoids	I	Problems/Video/ Interactive quizzes
Energy density & energy stored in a magnetic field	II	Problems/Presentation/Video/ Interactive quizzes
Maxwell's equations	III	Problems/Solved problems/Presentation / Video/ Interactive quizzes
RLC circuit	IV	Problems/Presentation / Video/ Interactive quizzes
Polarisation	V	Problems/Presentation /Video/ Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN(AUTONOMOUS), SIVAKASI.
DEPARTMENT OF MATHEMATICS
B. Sc. PHYSICS/CHEMISTRY
SEMESTER III
PART III - ALLIED COURSE
BDMT3A1– ALLIED MATHEMATICS I
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06(05+01)
Total number of hours per semester : 90(75+15)
No. of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the fundamentals of ODE, PDE, Laplace transforms.
CO2[K3]: solve problems of ODE by using Laplace transforms.
CO3[K3]:identify the methods for solving PDE.
CO4[K4]:examine the different forms of ODE for finding the solutions.
CO5[K5]:estimate the solution for scientific problems through differential equations.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	-	-	-	-	-
CO2	3	3	3	-	-	-	-
CO3	9	3	3	1	-	-	-
CO4	9	3	3	-	-	-	-
CO5	9	3	-	1	-	-	-
Weightage of the course	**33**	**15**	**9**	**2**	**-**	**-**	**-**
Weighted percentage of Course contribution to POs	**3.16**	**1.79**	**1.56**	**0.74**	**0**	**0**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit I **(15L + 3T)**

Differential Equations of FirstOrder: Introduction-Differential Equations-Equations of FirstOrder and FirstDegree-Exact DifferentialEquations-Integrating Factors – Linear Equations.

Unit II **(15L+ 3T)**

Linear Equations of HigherOrder: Introduction-Linear Equation with Constant Coefficients- Methods of FindingComplementaryFunctions-Methods of Finding Particular Integrals.

Unit III **(15L + 3T)**

Laplace Transform: Introduction-Laplace Transform-Inverse Laplace Transform-

Solution of DifferentialEquation using Laplace Transform

Unit IV **(15L + 3T)**

Partial Differential Equations: Introduction-Formation of Partial Differential Equations-First Order Partial Differential Equations-Methods of Solving First Order Partial Differential Equations-Some Standard Forms.

Unit V **(15L + 3T)**

Applications of Differential Equations: Introduction – Orthogonal Trajectories – Growth and Decay – Simple Electric Circuits. (**excluding sections 7.3-7.5**)

Text Book:

Dr. S. Arumugam & Mr. A. Thangapandi Isaac (2004),
Ancillary Mathematics –Paper II,
New Gamma Publishing House, Palayamkottai.

ReferenceBooks:

1. Dr.SudhirK.Pundir& Bhupendra Singh(2008),
   Differential Equations and Integral Transforms,
   Pragati PrakashanPublishers,Meerut.

2. S.Narayanan& T.K. Manickavasagampillai(2010),
   Calculus – Volume III,
   S.Viswanathan (Printers & Publishers) Pvt.Ltd, Chennai

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Equations of first order and first Degree	I	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
Methods of finding complementary functions	II	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
Solution of differential equation using laplace transform	III	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
First Order Partial Differential Equations	IV	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
Orthogonal Trajectories	V	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

தி ஸ்டாண்டர்டு .ஃபயர்ஒர்க்ஸ் இராஜரத்தினம் மகளிர் கல்லூரி (தன்னாட்சி), சிவகாசி

தமிழ்த்துறை

இளநிலை இரண்டாம் ஆண்டு – நான்காம் பருவம்

பகுதி I - பொதுத்தமிழ்

BDGT41 - கவிதை இலக்கியமும் சிறுகதையும்

(ஜூன் 2020 ஆம் ஆண்டில் சேர்ந்தவர்களுக்கும் அதற்குப்பின் சேர்பவர்களுக்கும் உரியது)

ஒரு வாரத்திற்குரிய பாடமணிநேரம் : 06 (5+1)

ஒரு பருவத்திற்குரிய மொத்தப் பாடமணி நேரம் : 90 (75+15)

தாளின் மதிப்பு : 03

இப்பாடத்தை முழுமையாகக் கற்றபின் மாணவியர் பெறும் திறன்கள்

CO1[K2]: இலக்கியங்களின் உட்பொருளினை எடுத்துரைப்பர்.

CO2[K3]: இலக்கிய வரலாறு, அணிவகைகளின் இலக்கணத்தையும், கலைச்சொற்களின் பொருளையும் அடையாளப்படுத்துவர்.

CO3[K3]: இலக்கியப் படைப்புகளில் பதிவாகியுள்ள சமூகச் சிந்தனைகளைக் கட்டமைப்பர்.

CO4[K4]: இலக்கியங்கள் புலப்படுத்தும் மனிதநேயக் கருத்துக்களை ஆராய்வர்

CO5[K5]: இலக்கியப் படைப்புகளில் இடம்பெறும் மாந்தர்களின் பண்புநலன்களை மதிப்பிடுவர்.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	1	-	1	1
CO2	3	3	1	-	-	-	-
CO3	3	3	1	-	-	-	-
CO4	3	3	-	1	-	-	-
CO5	1	3	-	-	-	-	-
Weightage of the course	**13**	**15**	**3**	**2**	**-**	**1**	**1**
Weighted percentage of Course contribution to POs	**1.25**	**1.79**	**0.52**	**0.74**	**0**	**0.7**	**0.63**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

கூறு 1: **(15வி + 03ப)**

மரபுக்கவிதைகள் :

1. பாரதியார் - நல்லதோர் வீணை
2. பாரதிதாசன் - உலகப்பன் பாட்டு
3. கவிமணி தேசிக விநாயகம் பிள்ளை - பெண்களின் உரிமைகள்
4. நாமக்கல் கவிஞர் - சுகாதாரக் கும்மி
5. பட்டுக்கோட்டை கல்யாண சுந்தரனார் - மனிதனாக வாழ்ந்திட வேணும்
6. கண்ணதாசன்-அச்சம் என்பது மடமையடா

கூறு 2: **(15வி + 03ப)**

புதுக்கவிதைகள் :

1. கவிஞர் சுரா - அலர், அலர்
2. வாலி -அந்தப் பிறைநிலா
3. அப்துல் ரகுமான்- ஒப்பில்லாத சமுதாயம்
4. மு.மேத்தா - இந்தியா என் காதலி
5. ஈரோடு தமிழன்பன் - புரட்சியின் கர்ப்பம்
6. வைரமுத்து - இராமர்களுக்கு இன்று ரத்தமில்லை
7. தேர்ந்தெடுக்கப்பட்ட ஹைக்கூ கவிதைகள்

கூறு 3: **(15வி+ 03ப)**

தொடக்ககாலச்சிறுகதைகள் :

1. புதுமைப்பித்தன் - ஒருநாள் கழிந்தது
2. த.ஜெயகாந்தன் - தவறுகள், குற்றங்கள் அல்ல.
3. கி.ராஜநாராயணன் - காய்ச்ச மரம்
4. ஜானகிராமன் - இராவணன் காதல்
5. ச.தனுஷ்கோடி ராமசாமி - அன்பு வெல்லும்

கூறு 4: **(15வி + 03ப)**

இக்காலச்சிறுகதைகள் :

1. கந்தர்வன் - தனித்தனியாய் தாகம்
2. மேலாண்மை பொன்னுச்சாமி - விரல்
3. ரகுநாதன்.தொ.மு. - கூண்டுக்கிளி
4. வண்ண நிலவன் - வலி
5. ச.சுபாஷ் சந்திரபோஸ் - உயிர்கருவாடுகள்

கூறு 5: **(15வி + 03ப)**

இலக்கணமும் இலக்கியவரலாறும்

அணியிலக்கணம் : உவமை, உருவகம்,தற்குறிப்பேற்றம்.

தேர்ந்தெடுக்கப்பட்ட கலைச்சொற்கள்.

இலக்கிய வரலாறு : பாடப்பகுதியோடு தொடர்புடைய இலக்கிய வரலாறு

பாடநூல் :

1. தமிழ்த்துறைப் பதிப்புக்குழு - இலக்கியக் கொத்து
   தமிழ்த்துறை வெளியீடு,
   நியூசெஞ்சுரி புக் ஹவுஸ்,
   சென்னை, 2018.

பார்வை நூல்கள் :

1. வல்லிக்கண்ணன் - புதுக்கவிதை தோற்றமும் வளர்ச்சியும்,
   அன்னம் வெளியீடு,
   சிவகங்கை, 1977.
2. சி.சு.செல்லப்பா - தமிழில் சிறுகதை பிறக்கிறது,
   எழுத்துப் பிரசுரம்,
   சென்னை, 1983.
3. முனைவர் பாக்யமேரி - வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு,
   நியூசெஞ்சுரி புக் ஹவுஸ் (பி) லிட்,
   சென்னை,
   ஐந்தாம்பதிப்பு - மே,2013.

Tutorials : (பயிற்சி)

Topic	Unit	Constructive Alignment – Learning Activity
மரபுக்கவிதைகளின் உள்ளடக்கம்	I	Group Discussions
புதுக்கவிதைகளின் சமூகக்கருத்துக்கள்	II	Mindmap,
சிறுகதைகளின் மையக்கரு	III	Mindmap
சிறுகதைகளின் சிக்கல்கள்	IV	Group Discussions
கலைச்சொற்கள்	V	Scrap Book

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTER IV
PART – I – HINDI LANGUAGE COURSE
BDGH41 - HINDI LANGUAGE COURSE- IV
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the significant contributions of the writers and the history of Hindi Literature
CO2 [K2]: explain the renowned literary pieces
CO3 [K3]: identify the techniques and writing style of writers and demonstrate the ability to write on given topics
CO4 [K4]: analyse the literary elements in the works of writers
CO5 [K5]: appraise the works of writers, practice the art of translation

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	1	0	1	1
CO2	3	3	1	0	0	0	0
CO3	3	3	1	0	0	0	0
CO4	3	3	0	1	0	0	0
CO5	1	3	0	0	0	0	0
Weight age of the course	**13**	**15**	**3**	**2**	**0**	**1**	**1**
Weighted percentage of Course contribution to POs	**1.25**	**1.79**	**0.52**	**0.74**	**0**	**0.7**	**0.63**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit- I: Poetry (15L+5T)

Ancient Poets : Bihari – 1- 10 Doha; Rahim – 1- 5 Doha
Modern Poets :Ravindrakumar Jain – 1, Rukmaji Rao Amar – 1, Sumathendra-1

Unit- II: History of Hindi Literature (15L)

Salient features of VeergathaKal, Bhaktikal, Reetikal, Chayavad, Pragativad& Prayogvad in Modern History, Mythilicharan Gupta, Jayashankar Prasad, Premchand.

Unit- III: General Essays **(15L)**

TOPICS: 1.ParyavaranaurPradooshan 2.Bharatiya nari
3.Yuva Varg4.Aajkishiksha
5.Gandhiji KeVichar6.Ataqnkavad
7.Bharat main Janatantra8.Sahitya ka Prabhav
9.Naitik moolya 10.Bharat main khel- kood

Unit- IV: Translation **(15L+5T)**

First 6 English passages from AnuvadAbhyas – Part III & Precise Writing

Unit- V: Short Stories **(15L+5T)**

Prem Chand- "Parichay", MahadeviVerma- "Ghisa", ShrimathiMannu Bhandari- "Do Kalakar"

Reference Books

AnuvadAbhyas Part III. Chennai: D.B.H.P.Sabha, 2010.

Hindi Prachar Vahini-3. Chennai: D.B.H.P.Sabha, 2019.

Kavya Kusum-3. Chennai: D.B.H.P.Sabha, 2009.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Poetry	I	Interactive Quiz
Translation	IV	Exercise
Short Stories	V	Role Play

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A DEGREE PROGRAMME
SEMESTER IV
PART – I – FRENCH LANGUAGE COURSE
BDGF41 - FRENCH LANGUAGE COURSE- IV
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the basic elements of grammar in French
CO2 [K2]: explain the grammatical concept, express their feelings and opinions in French
CO3 [K3]: use grammar in framing correct sentences
CO4 [K4]: analyse the importance of French in day to day life
CO5 [K5]: assess the usage of French grammar in everyday life

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	1	0	1	1
CO2	3	3	1	0	0	0	0
CO3	3	3	1	0	0	0	0
CO4	3	3	0	1	0	0	0
CO5	1	3	0	0	0	0	0
Weight age of the course	**13**	**15**	**3**	**2**	**0**	**1**	**1**
Weighted percentage of Course contribution to POs	**1.25**	**1.79**	**0.52**	**0.74**	**0**	**0.7**	**0.63**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit-I **(15L+5T)**

1. Employer les pronomsrélatifs
2. Expressions de condition

Unit- II **(15L+5T)**

1. Le gérondif
2. Le participe passé
3. Plus que parfait

Unit- III **(15L)**

1. Parler d'un voyage
2. Parler de sport

3. Parler de musique

Unit-IV **(15L+5T)**

1. Le subjonctif passé
2. L ' expression du futur

Unit-V **(15L)**

1. Faire des hypothèsesdans le passé
2. Exprimer des goûts

Text Book: Campus 2 - C.L.E International – Paris, 2002.

Jacky Girardet et JaquesPécheur

Unités : 7 to 12

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Compare how people spend money in India and in France	I	Presentation
Life history of Marie Curie	II	Presentation
Compare the education system in France and in India	IV	Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF ENGLISH
B.A/ B.Sc/B.C.A/ DEGREE PROGRAMME
SEMESTER IV
PART II– ENGLISH
BDGE41 –ENGLISH FOR ENRICHMENT - II
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture + Tutorial) : 90 (75+15)
Number of credits : 03

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the content through the study of language and literature
CO2 [K2]: comprehend and respond to passages, situations and texts
CO3 [K3]: apply appropriate vocabulary and construct ideas
CO4 [K4]: analyze the prescribed literary pieces
CO5 [K5]: develop grammatical structures accurately and appraise literature

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	0	1	1	1	0
CO2	1	3	0	3	1	0	1
CO3	3	3	1	3	3	0	1
CO4	3	3	1	3	0	3	0
CO5	3	3	3	3	0	3	1
Weightage of the course	**11**	**13**	**5**	**13**	**5**	**7**	**3**
Weighted percentage of Course contribution to POs	**1.05**	**1.55**	**0.87**	**4.8**	**5.81**	**4.9**	**1.89**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit – I : Listening and Speaking (13L+5T)
Hopes and Expectations
Complaining & Suggestions
Situational Conversations
Reporting
Reaching Conclusions
Possibilities

Unit – II: Reading and Writing (18L)
Comprehension: 10 Passages
Cover letter
Resume

Essay Writing

Unit – III : Grammar and English Usage **(18L)**

Direct and Indirect Speech
Subject-Verb-Agreement
Homonyms, Homophones, Homographs
Idioms and Phrases (P-Z)

Language through Literature

Unit - IV : Drama

William Shakespeare - *A Midsummer Night's Dream* **(13L+5T)**

Unit – V :Short Story **(13L+5T)**

Saki - "Mrs.Packletide's Tiger"
Geeta Goswami - "The Lost Shore"
Alphonse Daudet - "The Old Folks at Home"

Reference Books:

Augustine, A.E. and K.V.Joseph. *Macmillan Grammar: A Handbook.* New Delhi: Macmillan India Ltd., 2007.

Farhathullah, T.M. *Communication Skills for Undergraduates*. 1st ed. Chennai: R.B.A. Publications,

Lalitha Natarajan, Sasikala Natesan. *English for Excellence*, Chennai: Anuradha Publications, 2006.

Reading Cards, CIEFL, Project English 400 (MHRD), Orient Longman Publications, 1992.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Listening and Speaking	I	Orell Software in Language Lab & Presentation
Grammar and English Usage	IV	Interactive Quiz& Gamification
Language through Literature Drama	V	Video/Film

Marks are recorded for each student in each learning activity and which can be taken as assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER III
PART – III - MAJOR COURSE
BDPH41 – BASIC ELECTRONICS
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 05(04+01)
Total number of hours per semester(Lecture hour + Tutorial): 75(60+15)
Total number of Credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: describe transistor parameters, transistor classifications, various types of transistor biasing, feedback concepts, types of oscillators, multivibrators, diodes and op-amps.

CO2[K2]: explain transistor biasing methods, working of single stage, multistage transistor amplifiers, different types of oscillators, multivibrators and op-amps.

CO3[K3]: determine transistor parameters, voltage gain, input and output impedence of amplifiers, frequency of oscillators, slew rate and band width using electronic devices.

CO4[K4]: analyze different types of transistor biasing, coupling in transistor amplifier, significance of feedback Circuits, oscillators, Multivibrators and op-amps.

CO5[K5]: evaluate the necessary parameters for the proper functioning of electronic circuits by applying appropriate conditions.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**39**	**33**	**33**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.74**	**3.94**	**5.72**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit-I

Transistors: **(12L+3T)**

Transistor - Naming the transistor terminals - Some facts about the transistor-Transistor action – Transistor symbols – Transistor circuit as an amplifier– Common Emitter connection – Characteristics of Common Emitter connection – Transistor load line analysis – Operating point – Cut off and saturation points – Power rating of transistor.

Transistor Biasing :

Faithful amplification-Transistor biasing-Stabilisation-Essentials of a transistor biasing circuits – Stability factor – Methods of transistor biasing – Base resistor method – Biasing with collector feedback resistor – Voltage divider bias method.

Unit-II

Single stage transistor amplifiers: **(12L+3T)**

Single stage Transistor Amplifier - How transistor amplifies – Graphical demonstration of transistor amplifier – practical circuit of transistor amplifier – Phase reversal – Input/output Phase Relationships- D.C and A.C equivalent circuits – Load line analysis – Voltage gain – A.C emitter resistance – Formula for A.C emitter resistance –Classification of amplifiers – Amplifier equivalent circuit - Equivalent circuit with signal source.

Multistage transistor amplifiers:

Multistage transistor amplifiers – RC coupled transistor amplifier – Transformer coupled amplifier – Direct coupled amplifier – Comparison of different types of coupling.

Unit-III

Feedback Principles: **(12L+3T)**

Feedback – Principles of negative voltage feedback in amplifiers – Gain of negative voltage feedback amplifiers –Advantage of Negative Voltage feedback - Feedback circuit-Principles of negative current feedback - Current gain with negative current feedback – Effects of negative current feedback – emitter follower – D.C analysis of emitter follower – Voltage gain of emitter follower – Input impedance of emitter follower – Output impedance of emitter follower – Applications of emitter follower- Darlington amplifier.

Oscillators:

Essentials of transistor oscillator – Explanation of Barkhausen Criterion – Different types of transistor oscillators – Colpitt oscillator – Hartley oscillator – principle of Phase Shift oscillators - Phase Shift oscillator – Wien Bridge oscillator.

Unit-IV

Solid –State Switching Circuits: **(12L+3T)**

Switching action of a transistor – Multivibrators – Types of multivibrators – Transistor Astable multivibrator - Transistor Monostable multivibrator - Transistor Bistable multivibrator - Important applications of diodes - Clipping circuits-Applications of Clippers-Clamping circuits - Basic idea of a Clamper-Positive clamper-Negative Clamper.

Unit-V

Operational Amplifiers: **(12L+3T)**

Operational Amplifier – Differential amplifier – Basic circuit of differential amplifier – Operation of differential amplifier – Common-mode and differential-mode signals – Common mode rejection ratio – Schematic symbol of operational amplifier – Bandwidth of an OP-amp – Slew rate – Applications of summing amplifiers - OP-amp Integrators and

Differentiators – Op-amp Integrator - OP-amp Differentiator – Comparators – Comparator circuits.

Text Book:

V.K.Mehta and Rohit Mehta - Principles of Electronics
S.Chand & Company Limited,
New Delhi. First Edition 1980,
Reprint 2010.

Reference Books:

1) Albert Malvino & David J.Bates - Electronic Principles
Tata Mc Graw Hill Publishing Company Limited,
New Delhi.
7th Edition (Special Indian Edition 2007)

2) N.N.Bhargava, D.C. Kulshreshtha, & S.C Gupta - Basic Electronics and Linear Circuit
Tata Mc Graw Hill Education, 1984.
Technical Teachers Training Institution,
Chandigarh.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Transistor and its Biasing	I	Scrap book/ Mind Map/Video/ Interactive quizzes
Single stage and Multi Stage transistor amplifiers	II	Case Study/Presentation Group discussion/debate
Feedback Principles and Oscillators	III	Case Study/Presentation /Mind Map/Video/Mini project
Multivibrators	IV	Mini project/Display/ Case Study/Presentation /Mind Map/Video
Operational Amplifiers	V	Mini project/Display/ Case Study/Presentation /Mind Map/Video

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER III & IV
PART – III - MAJOR COURSE
BDPH4L – ELECTRICITY AND ELECTRONICS LAB
(Any 16 experiments)
(For those who have joined in June 2020 and later)

Contact hours per week : 03
Total number of hours per semester : 45
Total number of Credits : 04

Course Outcomes (CO):

On successful completion of the course, the learners should be able to
CO1[K2]: explain the principles of the experiment
CO2[K3]: construct the electrical and electronic circuits
CO3[K4]: devise the experiments and record data
CO4[K4]: analyze the data and draw conclusions mathematically and graphically
CO5[K5]: evaluate the results of the experiments in an ethical manner

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	3	1	1
CO2	9	3	3	0	3	1	1
CO3	9	9	9	1	3	1	1
CO4	9	9	9	1	3	1	1
CO5	9	9	9	1	3	1	1
Weightage of the course	**37**	**33**	**33**	**3**	**15**	**5**	**5**
Weighted percentage of Course contribution to POs	**3.55**	**3.94**	**5.72**	**1.11**	**17.44**	**3.5**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

List of experiments

1. Potentiometer – Comparison of EMF
2. Potentiometer – Resistance & Resistivity (Copper)
3. Table Galvanometer – Figure of Merit
4. Table Galvanometer – Conversion of Galvanometer into Voltmeter & Ammeter
5. Carey-Foster Bridge – Resistance & Resistivity
6. Anderson's Bridge
7. Determination of Thermo emf

8. Determination of Absolute Mutual Inductance
9. Field along the axis of the coil
10. Owen's Bridge
11. e/m experiment – Thomson's method
12. Characteristics of LED
13. Verification of Malus law
14. Determination of Brewster's angle and refractive index
15. Series Resonance Circuit
16. Parallel Resonance Circuit
17. Transistor Characteristics - Common Emitter
18. Transistor Characteristics - Common Base
19. Transistor Characteristics - Common Collector
20. Hartley oscillator
21. Colpitt oscillator
22. Clippers using diode
23. Clampers using diode
24. Inverting and Non-Inverting Amplifier – IC741
25. Summing Amplifier – IC741
26. Difference Amplifier – IC741
27. Characteristics of fuel cell
28. Characteristics of microbial fuel cell

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN(AUTONOMOUS), SIVAKASI.
DEPARTMENT OF MATHEMATICS
B. Sc. PHYSICS/CHEMISTRY
SEMESTER IV
PART III - ALLIED COURSE
BDMT4A1– ALLIED MATHEMATICS II
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06(05+01)
Total number of hours per semester : 90(75+15)
No. of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the basic concepts in vector calculus and algebraic structure.
CO2[K2]:discuss properties of vector valued functions.
CO3[K3]: solve the line and surface integrals.
CO4[K4]:examine Green's, Gauss's and Stoke's theorem for vector valued functions
CO5[K4]: analyse the characterization and equivalence criterion of groupstructures.

CO-PO Mapping table (Course Articulation Matrix)

Pos / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	-	1	-	-	-
CO2	3	3	-	-	-	-	-
CO3	9	3	-	-	-	-	-
CO4	9	9	3	-	-	-	-
CO5	9	9	3	1	-	-	-
Weightage of the course	**33**	**27**	**6**	**2**	**-**	**-**	**-**
Weighted percentage of Course contribution to POs	**3.16**	**3.22**	**1.04**	**0.74**	**0**	**0**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit I **(15L + 3T)**

Vector differentiation: Introduction-Vector algebra-Differentiation of vectors-Gradient-Velocity and acceleration -Divergence and curl**.**

Unit II **(15L + 3T)**

Line and Surface Integrals: Introduction-Line integrals-Surface integrals-Theorems of Green, Gauss &Stoke's (without proof).

Unit III **(15L + 3T)**

Matrices:Introduction –Matrices -Cayley Hamilton Theorem-Eigen Values and Eigen Vectors.

Unit IV **(15L + 3T)**

Groups:Definition and examples - Elementary properties of Group - Equivalent definitions of a group.

Unit V **(15L + 3T)**

Subgroups -Cyclic groups – Order of an element - Coset& Lagrange's theorem – Normal subgroups and Quotient group.

Text books :

1. Dr. S. Arumugam & Mr. A. Thangapandi Isaac (2004), Ancillary Mathematics –Paper II, New Gamma Publishing House, Palayamkottai. **(For UnitI& Unit II)**

2. Dr. S. Arumugam & Mr. A. Thangapandi Isaac (2006), Ancillary Mathematics –Paper III, New Gamma Publishing House, Palayamkottai. **(For Unit III,UnitIV& Unit V)**

Reference Books:

1. M.L.Khanna (2007), Modern Algebra, Jai Prakash Nath & Co.,Meerut.

2. S.Narayananm, R.Hanumantha Rao, T.K. Manickavasagampillai(2007) Ancillary Mathematics – Volume –II S.VViswanathanPvt.Ltd.Chennai

Tutorials:

Topic	Unit	Constructive Alignment-Learning Activity
Divergence and curl	I	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
Green, Gauss &Stoke'sTheorem	II	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
Cayley Hamilton Theorem	III	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
Properties of Group	IV	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map
Coset& Lagrange's theorem	V	Interactive Quizzes/ Videos /Presentation /Group Discussion/mind map

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER – IV
PART – IV – ABILITY ENHANCEMENT COURSE
DISCIPLINE SPECIFIC COURSE
BDPH4DSL - LAB - SCIENTIFIC SKILL DEVELOPMENT
(Any 8 experiments)
(For those who have joined in June 2020and later)

Contact hours per week : 02
Total number of hours per semester : 30
Total number of Credits : 02

Course Outcomes (CO):

On successful completion of the course, the learners should be able to
CO1[K2]: explain the principles of the experiment
CO2[K3]: construct the electrical and electronic circuits
CO3[K3]: determine the physical parameters
CO4[K4]: analyze the data and draw conclusions mathematically and graphically
CO5[K5]: evaluate the results of the experiments in an ethical manner

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	1	0	1	1
CO2	3	3	3	1	0	1	1
CO3	9	9	9	1	0	1	1
CO4	9	9	9	1	0	1	1
CO5	9	9	9	1	0	1	1
Weightage of the course	**31**	**30**	**30**	**5**	**0**	**5**	**5**
Weighted percentage of Course contribution to POs	**2.97**	**3.58**	**5.2**	**1.85**	**0**	**3.5**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)
List of experiments

1. Power Point Presentation on science topics
2. Review of a scientific article
3. Error calculation
4. Latest inventions using chart or model
5. Trouble Shoot – Potentiometer
6. Trouble Shoot – Ammeter calibration
7. Trouble Shoot – Junction diode
8. Trouble Shoot – Zener diode

9. Trouble Shoot – Resistor in serial combination
10. Trouble Shoot – Resistor in parallel combination
11. Trouble Shoot – capacitor in serial combination
12. Trouble Shoot – capacitor in parallel combination
13. Trouble Shoot – Table Galvanometer
14. Trouble Shoot – Figure of merit
15. Trouble Shoot – OP-AMP (Adder)
16. Trouble Shoot – OP-AMP (Subtractor)
17. Trouble Shoot – OP-AMP (Inverting)
18. Trouble Shoot – OP-AMP (Non – Inverting)
19. Demo of the experiment
20. Soldering wires and Electronic Components

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER V
PART – III - MAJOR COURSE
BDPH51 – CLASSICAL MECHANICS
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05 + 01)
Total number of hours per semester(Lecture hour + Tutorial): 90 (75 + 15)
Total number of credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: summarize the basic concepts in Classical Mechanics

CO2[K2]: describe conservation laws, generalised coordinates, Lagrangian & Hamiltonian formulations, motion under central force, rotating frames and relative co-ordinate systems

CO3[K3]: apply various concepts of classical mechanics to solve problems.

CO4[K4]: investigate mechanics of particles, Lagrangian & Hamiltonian formulations for different systems, Kepler's problem, two body problem, rotating frames and relative co-ordinate systems

CO5[K5]: interpret the shape of the orbits or path of a moving particle, effects and applications of Coriolis force

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**3**	**1**	**1**	**1**	**0**	**0**	**0**
CO2	**3**	**3**	**1**	**1**	**0**	**0**	**0**
CO3	**9**	**9**	**3**	**1**	**0**	**0**	**0**
CO4	**9**	**9**	**3**	**1**	**0**	**0**	**0**
CO5	**9**	**9**	**3**	**1**	**0**	**0**	**0**
Weightage of the course	**33**	**31**	**11**	**5**	**0**	**0**	**0**
Weighted percentage of Course contribution to POs	**3.16**	**3.7**	**1.91**	**1.85**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

Basic Concepts and Lagrangian Formulation (15L+3T)

Classical Mechanics and other Theories – Conservation Principle (Laws) - Mechanics of a Particle – Conservation of Linear Momentum – Conservation of Angular Momentum – Conservation of Energy – Mechanics of a System of Particle - Conservation of Linear

Momentum – Conservation Theorem for Angular Momentum - Conservation of Energy – Constrained Motion, Constraints, Degrees of Freedom.

Unit – II

Variational Principle and Lagrangian Formulation (15L+3T)

Generalised Co-ordinates – Generalised Notations – Limitations of Newton's Laws – Hamilton's Variational Principle -Deduction of Lagrange's Equations by Differential Method (D'Alembert's Principle) - Non- Conservative Forces : Dissipative system: Rayleigh's Dissipation Function – Applications of Lagrange's Equations of motion – Linear Harmonic Oscillator – Simple Pendulum – Dumb Bell – Particle Moving on the surface of Earth - Compound Pendulum – Atwood's Machine.

Unit – III

Hamiltonian Formulation (15L+3T)

Phase space and the motion of the System - Hamiltonian – Hamilton's Canonical equations of motion – physical significance of H – Deduction of Canonical Equations from a variational principle - Applications of Hamilton's equations of motion: Simple Pendulum - Compound Pendulum - Linear Harmonic Oscillator - Particle in central field of force.

Unit – IV

Motion Under Central Force : Two body problem (15L+3T)

Equivalent one body problem – General features of central force motion – Equivalent one dimensional problem: General Features of the Orbits – Stability of orbits and conditions for closure - Motion under Inverse square Force: Kepler's problem.

Unit –V

Rotating Frames and Relative Co-ordinate Systems (15L+3T)

Inertial v/s Non inertial systems – translational motion – rotating co-ordinate system – effect of Coriolis force on the moving bodies on earth –free fall of a body on earth's surface-some more terrestrial and meteriological manifestations of Coriolis force – formation of cyclones – trade winds and tropical winds – derivation of Coriolis force from Lagrangian formulation - Focault Pendulum- Precession of charged particles in a magnetic field.

Text Book:

S.L. Gupta, V. Kumar, H.V. Sharma – Classical Mechanics (Pragati: Prakashan Publications Twenty- Seventh Edition, 2015, Reprint June 2016.

Reference Books:

1. Herbert Goldstein - Classical Mechanics, Narosa Publishing House, New Delhi, Third Edition, 2002.

G. Aruldhas - Classical Mechanics, Sixth Printing, 2015, PHI Learning Pvt. Ltd. Delhi.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Conservation laws	I	Video/ Interactive quizzes
Applications of Lagrange's Equations of motion	II	Scrap book/ Presentation/Video/ Interactive quizzes
Applications of Hamilton's equations of motion	III	Presentation / Video/ Interactive quizzes
General Features of the Orbits	IV	Presentation / Video/ Interactive quizzes
Coriolis force	V	Presentation /Video/ Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.

DEPARTMENT OF PHYSICS

B.Sc. PHYSICS

SEMESTER V

PART –III - MAJOR COURSE

BDPH5L – PHYSICS LAB – I

(Any 16 experiments)

(For those who have joined in June 2020 and later)

Contact hours per week : 06
Total number of hours per semester : 90
Total number of Credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain the principles of the experiments
CO2[K3]: construct electronic and non-electronic circuits
CO3[K3]: determine the physical parameters through various experimental techniques
CO4[K4]: analyze the data and draw conclusions manually and graphically
CO5[K5]: evaluate the experimental results with laboratory ethics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	3	0	0	1
CO2	9	3	9	3	0	0	1
CO3	9	9	9	3	0	0	1
CO4	9	9	9	3	0	0	1
CO5	9	9	9	0	0	3	1
Weightage of the course	**39**	**30**	**36**	**12**	**0**	**3**	**5**
Weighted percentage of Course contribution to POs	**3.74**	**3.58**	**6.24**	**4.43**	**0**	**2.1**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

List of Experiments:

1. Integrator, Differentiator using discrete components
2. AND, OR, NOT, EX-OR gates using discrete components
3. AND,OR,NOT,EX-OR,NOR gates using IC 7400
4. AND,OR,NOT,EX-OR,NAND gates using IC 7402
5. Verification of De Morgan's theorem
6. Half Adder and Full Adder
7. Half Subtractor and Full Subtractor
8. Realisation of Boolean Expressions

9. Integrator, Differentiator using OP - AMP
10. AC frequency by Sonometer
11. Boltzmann constant
12. Comparison of emfusing BG
13. Comparison of Capacitance – DeSauty's Bridge
14. LR Circuit
15. Rydberg Constant – Hydrogen Spectrum
16. Photocell – Verifying laws of photo electric emission
17. Solar cell characteristics
18. Dielectric constant
19. Millikan's oil drop experiment (charge of an electron)
20. Geiger Muller counter (distinguish between beta and gamma radiation)
21. Single stage amplifier
22. Phase- shift oscillator
23. Maxwell's bridge
24. Air wedge
25. i-d curve
26. Refractive index of a liquid by hollow prism
27. Determination of Refractive index of hemoglobin liquids
28. Determination of Refractive index of plant cells.
29. Cauchy's constant
30. Photo diode - characteristics

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
SEMESTER V
PART III – MAJOR COURSE
BDPH5V– INTERNSHIP/ON-THE-JOB TRAINING

(For those who have joined in June 2020 and later)

Number of credits : 1

Course Outcomes:

On successful completion of the course, the learners should be able to

CO1[K2]: relate the class room theory with work place practice.
CO2[K3]: apply the practices / procedures observed in real time working environment
CO3[K4]: analyze the workflow and communication flow prevailing in the institution/industry
CO4[K5]: assess interests and abilities in their field of study
CO5[K6]: propose strategies, policies and guidelines for enhancing efficiency of industrial/institutional operations

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	-	-	-	-	-
CO2	3	3	-	-	1	-	-
CO3	3	3	3	3	-	-	3
CO4	3	3	1	-	-	-	-
CO5	9	3	3	3	-	-	-
Weightage of the course	**21**	**15**	**7**	**6**	**1**	**-**	**3**
Weighted percentage of Course contribution to POs	**2.01**	**1.79**	**1.21**	**2.21**	**1.16**	**0**	**1.89**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

RULES GOVERNING INTERNSHIP

1. Each student has to undergo 15 days practical training during the II/III/IV Semester Vacation.
2. The students are expected to undergo training in any institution / industry / service unit relating to their field of study.
3. The student has to submit two copies of the report in not less than 20 pages, within 2 weeks from the date of commencement of V semester.
4. The training report shall be evaluated by the guide and the external examiner for 50 marks. The Viva-voce examination shall be conducted jointly by the guide and external examiner for 50 marks. The result will be published along with the V semester results.
5. For a pass in the internship, each student should secure a minimum of 50% of marks.
6. If a student fails to get a minimum pass mark, she will be permitted to resubmit her training report once again.
7. If a student fails to submit the training report within the stipulated time the candidate can submit the same after getting permission from the Chief Controller of Examinations along with the fine.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER V
PART – III - MAJOR ELECTIVE COURSE
BDPH5E1 - DIGITAL ELECTRONICS
(For those who have joined in June 2020 and later)

Contact Hours per Week(Lecture hour + Tutorial) : 05 (04+01)
Total number of Hours per Semester(Lecture hour + Tutorial): 75 (60+15)
Total number of Credits : 05

Course Outcomes:

On successful completion of the course, the learners should be able to

CO1[K2]: explain the basic principles of number systems, codes and digital systems
CO2[K2]: describe the working of digital circuits for arithmetic/logical operations, memory, counters and converters
CO3[K3]: apply digital principles to solve problems.
CO4[K4]: analyze various types of gates, flip flops, registers, counters, D/A and A/D converters
CO5[K6]: design digital logic circuits.

CO-PO Mapping table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	3	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**39**	**33**	**27**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.74**	**3.94**	**4.68**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

Number Systems and Codes **(12L+3T)**

Binary numbers – Binary to Decimal Conversion – Decimal to Binary Conversion – Octal numbers – Hexadecimal numbers – The ASCII code – The Excess 3-code – The Gray Code

Arithmetic Circuits

Binary Addition – Binary Subtraction – Unsigned Binary Numbers – Sign Magnitude Numbers – 2's complement representation – 2's complement arithmetic – Arithmetic building blocks – The adder – Subtractor.

Unit – II

Digital Logic **(12L+3T)**

Binary Number System – The Basic Gates – Boolean Algebra – NOR Gates – NAND Gates

Combinational Logic Circuits

Boolean laws and theorem-Sum –of- Products method-Truth table to Karnaugh map: Pairs, quads and octals - Karnaugh simplification-Don't care conditions-Product-of-sum methods-Product-of –Sums simplification

Unit – III

Flip-Flops **(12L+3T)**

RS Flip-Flops (NOR-GateLatch) – Gated Flip-Flops – Edge triggered RS flip-flops – Edge triggered D flip flop – Edge triggered JK flip-flops –JK Master slave flip flops.

Registers

Registers – Types of Registers – (Serial in – Serial Out) – (Serial in – parallel out) – (parallel in – serial out) – (parallel in – parallel out) – Ring counters.

Unit – IV

Counters **(12L+3T)**

Counters – Asynchronous counters: 3-bit binary ripple counter – Decoding Gates – Synchronous counters: Mod-8 parallel binary counter – Changing the modulus – Decade counters.

Unit – V

D / A Conversion and A / D Conversion **(12L+3T)**

Variable – Resistor Networks – Binary Ladders – 4-bit D / A Converter – D / A Accuracy and Resolution – A / D Converter – 2-bit Simultaneous conversion – A / D converter (Counter method) – A / D accuracy and Resolution.

Text Book:

Donald P.Leach & Albert Paul Malvino - Digital Principles and Applications
TATA McGraw – Hill Publishing
Company Limited, New Delhi,
Fifth Edition, Sixth Reprint 2004.

Reference Books:

1. M. Morris Mano - Digital Logic and Computer Design, Tenth edition (2006) Prentice-Hall of India Private Limited New Delhi.
2. Thomas L.Floyd - Digital fundamentals, 11th edition (2015), Pearson Education, India
3. Millman & Halkias - Integrated Electronics, Second edition (2017), McGraw Hill Education

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Number system conversion	I	Scrap book
Simplification using Karnaugh map/Boolean algebra	II	Group discussion/debate
Working of flip flop	III	Case Study/Presentation
Construct counter of any modulus	IV	Mini project/Display
D/A and A/D conversion accuracy and resolution	V	Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER - V
PART – III - MAJOR ELECTIVE COURSE
BDPH5E2 - ATOMIC AND NUCLEAR PHYSICS
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 05 (04+01)
Total number of hours per semester(Lecture hour + Tutorial): 75 (60+15)
Total number of Credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: explain the important phenomena in atomic nucleus
CO2[K2]: comprehend the atomic spectra, coupling of electrons, atomic nucleus, particle detectors and nuclear decay
CO3[K3]: solve the problems in atomic and nuclear physics
CO4[K4]: analyse various atomic and nuclear structures/models/spectra, types of coupling, radioactive decay and devices like detectors and accelerator
CO5[K5]: criticize various nuclear models, periodic table, the nuclear reaction and nuclear forces

CO-PO Mapping table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	1	0	0	1
CO2	3	3	0	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**33**	**30**	**27**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.16**	**3.58**	**4.68**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I **Atomic Physics** **(12L+3T)**

Structure of the Atom – I:

Rutherford's experiments on scattering of α-particles – Theory of α-particle scattering - Bohr Atom Model – Bohr Correspondence Principle – Critical potentials – Atomic excitation – Experimental determination of critical potentials.

Unit – II **(12L+3T)**

Structure of the Atom - II:

The vector atom model – Quantum number associated with the vector atom model – Coupling Schemes – The Pauli exclusion principle (Only statement) – The periodic classification of elements –Optical spectra – Fine structure of Hα Line – Zeeman Effect – Larmor's Theorem.

Photo electric effect:

Introduction – Experimental investigations on the photoelectric effect – Photoelectric cells

Unit–III **Nuclear Physics** **(12L+3T)**

Introduction to the Nucleus:

Introduction –Classification of Nuclei – General properties of nucleus – Binding energy – Nuclear stability – Theories of nuclear composition – Nuclear forces – Meson theory of nuclear force – The liquid drop model – The Shell model – The Collective model.

Unit – IV **(12L+3T)**

Detectors of nuclear radiations:

Introduction - Ionisation Chamber – Geiger-Muller Counter – Wilson-Cloud Chamber- Bubble Chamber – Nuclear Emulsions

Particle Accelerators:

The Cyclotron – Synchrocyclotron- The Betatron – The Synchrotrons – The Proton synchrontron(Bevatron, Cosmotron).

Unit – V **(12L+3T)**

Nuclear fission and Fusion:

Nuclear fission – Energy released in fission – Features of the fission reaction – Chain reaction – Atom bomb– Nuclear reactors – Nuclear fusion – Thermo nuclear reactions – Fusion reactor – Plasma confinement.

Elementary Particle:

Introduction – Particle and antiparticle – Elementary particle quantum numbers – The Quark model.

Text Book:

1. R.Murugeshan and KiruthigaSivaprasath – Modern Physics - 18th Reprint 2018 (twice) S. Chand and Company Ltd.,

Reference Books:

1. Irving Kaplan - Nuclear Physics - Addison Wesley Publishing Company- second edition-2002
2. D.C.Tayal - Nuclear Physics – Himalaya Publishing House – fifth edition – 2011
3. J.B.Rajam - Atomic Physics – S.Chand& co Publishing – seventh edition-1966

4. Arthur Beiser - Perspectives of Modern Physics – Tata McGraw Hill – International Edition - 1997

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Electron orbits	I	Mind map/ Presentation
The Periodic Table	II	Writing /Presentation
The Liquid Drop Model	III	Assignment/ Presentation
Gamma Decay	IV	Video/ Presentation/ Problem
Nuclear Fission	V	Mind map/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN(AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER V
PART – III - MAJOR ELECTIVE COURSE
BDPH5E3 – FIBRE OPTICS
(For those who have joined in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 05 (04+01)
Total number of hours per semester(Lecture hour + Tutorial): 75 (60+15)
Total number of Credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: summarize the basic concepts and importance of fibre optics
CO2[K2]: explain the requirements of fibre optic techniques.
CO3[K3]: classify the fabrication techniques and differentiate the functions of wave guides
CO4[K4]: analyse the required light sources for dispersion in optical fibres
CO5[K5]: interpret the transmission through optical fibres

CO-PO Mapping table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	3	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**39**	**33**	**27**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.74**	**3.94**	**4.68**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

UNIT I **(12L+3T)**

Refractive index and velocity of light:

Introduction – importance – generation of telephone system and optical fibers - Propagation of light in different media – propagation of light in optical fibre-basic structure and optical path of an optical fibre – acceptance angle and acceptance cone – Numerical aperture (NA) (General)- modes of propagation – Meridional and skew rays – Number of modes and cut off parameters of fibres – Single mode propagation – Comparison of step and graded index fibres – Applications of fibres. Classification of Optical fibres: Fibres – classification – stepped index fibre – Stepped index monomode fibre - Disadvantage of monomode fibre – Graded index multimode fibre – Plastic fibres – Mechanism of refractive index variation – Fibre strength - Mechanical strength measurement of fibres.

UNIT II **(12L+3T)**

Fibre fabrication:

Classification of fibre fabrication techniques – External chemical vapour deposition (External CVD) – Axial vapour deposition (AVD) – Internal chemical vapour deposition – Multi-element Glasses – Phasil system – Comparison of various fabrication processes – Fibre drawing and coating – Double Crucible method - "Rod-in-tube"method.

UNIT III **(12L+3T)**

Optical fibre as a cylindrical waveguide:

Optical fibre vs Cylindrical wave guide – Wave equations in step index fibres. Fibre losses: Attenuation in optic fibres – Material or impurity losses – Rayleigh scattering loss – Absorption loss – Leaky modes – Bending losses – Radiation induced losses – Inherent defect losses – Inverse square law losses – Transmission losses – Temperature dependence of fibre losses – Core and cladding losses.

UNIT IV **(12L+3T)**

Dispersion in Optical fibres:

Electrical vs Optical bandwidth – Bandwidth-Length product – Inter-modal dispersion – Mixing of modes – Material Chromatic dispersion – Waveguide dispersion – Dispersion Power Penalty – Total dispersion delay – Maximum transmission rate.

UNIT V **(12L+3T)**

Light Sources for Optical fibres:

Introduction – LED (light emitting diode) – Processes involved, Structure, materials and output power characteristics of LED - Fibre-LED coupling – Bandwidth, spectral emission of LEDs – Laser–Operation, types, spatial emission pattern, current vs output characteristics and modulation response of a Laser – Single frequency Laser – Suppression of modes in a Laser – Laser Chirp.

Text Book:

Subir Kumar Sarkar - Optical Fibres and Fibre Optic Communication Systems
S .Chand & Company Ltd., 4th Revised Edition, 2007

Reference Books:

1.Donard J.Sterling, JR., - Technician Guide to Fibre Optics
Vikas Publishing House,
III Edition, 2002

2.Ajoy Ghatak & K. Thygarajan - Introduction to Fibre Optics,
Cambridge University press, First edition 1998,
Reprinted 2000.

2. Gerd Keiser - Optical fiber communications,
McGraw-Hill, Inc. Second Edition, 1991

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Propagation of light in optical fibre	I	Mind map/ Presentation
Fibre fabrication	II	Writing /Presentation
Optical fibre vs Cylindrical wave guide	III	Assignment/ Presentation
Electrical vs Optical bandwidth	IV	Video/ Presentation/ Problem
LED (light emitting diode)	V	Mind map/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER V
PART –III - MAJOR ELECTIVE COURSE
BDPH5E4 – ENERGY PHYSICS
(For those who have joined in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 05 (04+01)
Total number of hours per semester(Lecture hour + Tutorial): 75 (60+15)
Total number of Credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the basics of energy sources
CO2[K2]: describe the applications of different energy sources
CO3[K4]: compare different forms of energy
CO4[K4]: analyse solar energy, wind energy and geothermal energy
CO5[K5]: appraise the advantages and disadvantages of energy sources

CO-PO Mapping table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	1	0	0	1
CO2	3	3	0	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**33**	**30**	**27**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.16**	**3.58**	**4.68**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

UNIT I (12L+3T)

An Introduction to Energy Sources:

Energy consumption as a measure of prosperity – World energy futures – Energy Sources and their availability: Introduction, Commercial or Conventional Energy Sources – Renewable Energy Sources. Solar radiation and its measurement: Introduction – Solar Constant – Solar radiation at the Earth's Surface – Solar Radiation Geometry – Solar radiation measurements – Solar radiation data.

UNIT II **(12L+3T)**

Solar Energy Collectors:

Introduction – Physical principles of the conversion of Solar radiation into heat – Flat plate collectors – Concentrating Collector: Focussing type – Advantages and disadvantages of Concentrating collectors over flat plate type collectors.

UNIT III **(12L+3T)**

Solar Energy Storage:

Introduction – Solar energy storage systems - Solar pond: Introduction, Principle of Operation and description of Non-convective solar pond, Extraction of thermal energy, Applications of Solar Ponds

Applications of solar energy:

Introduction - Solar water heating – Space heating – Solar thermal electric conversion – Solar electric power generation: Solar photo voltaic – Agriculture and Industrial process heat – Solar distillation – Solar green houses (Introduction and advantages)

UNIT IV **(12L+3T)**

Wind Energy:

Introduction – Basic principles of Wind Energy conversion: The nature of the wind – Basic components of a WECS (Wind Energy Conversion System) – Advantages of Disadvantages of WECS – Energy from Biomass: Introduction – Biomass conversion technologies – Photosynthesis – Biogas generation – Factors affecting Biodigestion or Generation of gas.

UNIT V **(12L+3T)**

Geo thermal Energy:

Introduction – Estimates of Geo thermal power – Nature of Geothermal fields – Geothermal sources – Advantages and Disadvantages of Geothermal Energy over other energy forms – Applications of Geothermal energy.

Energy from oceans:

Introduction – Ocean Thermal Electric conversion(OTEC): Introduction, Methods of ocean thermal electric power generation, Open cycle OTEC system, the closed or Anderon OTEC cycle, Heat Exchanger, Bio-fouling, Site-Selection, Energy utilisation, Hybrid Cycle, Conclusions.

Text Book:

G.D.Rai - Non-Conventional Sources of Energy
Khanna Publishers, Delhi
Fourth Edition, 13th Reprint 2004

Reference Books:

1. G.D.Rai - Solar Energy Utilization
Khanna Publications,
Fifth Edition Fourth Reprint, 2001
2. S.P.Sukatme - Solar Energy
Tata McGraw Hill Publishing Company,
IX Edition, 2003
3.Garg and Prakash, H.P.Garg - Solar Energy: Fundamentals and Applications
Tata McGraw Hill Education, first revised edition,2000
4. M.P.Agarwal - Solar Energy, S.Chand& Co, I Edition, 1985

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
World energy futures	I	Mind map/ Presentation
Solar Energy Collectors	II	Album /Presentation
Applications of Solar Ponds	III	Assignment/ Presentation
Biogas generation	IV	Video/ Presentation/ Model
Energy from oceans	V	Mind map/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
SEMESTER – V
PART IV – ABILITY ENHANCEMENT COURSES
SKILL BASED COURSES
BDCG51 – CAREER GUIDANCE
(For those who have joined in June 2020 and later)

Contact hours per week : 02
Total number of hours per semester : 30
Number of Credits : 02

Course Outcomes:
On successful completion of the course, the learners should be able to
CO1 [K1]: recall the basic concepts about history, culture of India and languages.
CO2 [K2]: summarize the various events related to Indian economy and Indian national movement.
CO3 [K2]: explain the multi - dimensional aspects of science.
CO4 [K3]: apply the mathematical knowledge to solve different problems.
CO5 [K5]: analyze the problems related to mental ability and reasoning power.

CO-PO Mapping Table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	-	1	-	1	-
CO2	3	1	-	-	-	1	1
CO3	3	1	3	-	-	-	-
CO4	3	3	1	-	-	-	-
CO5	3	3	3	-	-	-	1
Weightage of the Course (w)	**15**	**9**	**7**	**1**	**-**	**2**	**2**
Weighted percentage of Course contribution to POs	**1.44**	**1.07**	**1.21**	**0.37**	**0**	**1.4**	**1.26**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

General Awareness and Languages (10 hours)

History & Culture of India - Indus valley civilization - Guptas, Delhi Sultans, Mughals and Marathas - Age of Vijayanagaram and Bahmani Kingdoms - South Indian history. Characteristics of Indian culture, Unity in diversity – Race, language, custom. **Indian Polity** - Constitution of India - Preamble to the Constitution - Salient features of the Constitution - Union, State and Union Territory. Election - Judiciary in India – Rule of law. Evolution of 19th and 20th Century Socio-Political movements in Tamil Nadu - Justice Party, Growth of Rationalism - Self Respect Movement, Dravidian movement and Principles underlying both these movements, Contributions of Thanthai Periyar and Perarignar Anna. **Indian Economy** -

Sources of revenue – Reserve Bank of India – Fiscal Policy and Monetary Policy - Finance Commission – Resource sharing between Union and State Governments - Goods and Services Tax, Niti Aayog. **Indian National Movement** - Different modes of Agitation: Growth of Satyagraha and Militant movements.

Unit II

General Science **(10 hours)**

Physics - Nature of Universe - General Scientific Laws – Mechanics - Properties of Matter, Force, Motion and Energy - Everyday application of the basic principles of Mechanics, Electricity and Magnetism, Light, Sound, Heat, Nuclear Physics, Laser, Electronics and Communications. **Chemistry** - Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilizers, Pesticides. **Nature Science** - Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human diseases. Environment and Ecology. **Information technology** - Basic terms, Communications - Application of Information and Communication Technology (ICT) - Decision making and problem solving - Basics in Computers / Computer terminology.

Unit III

General Aptitude, Mental Ability and Languages **(10hours)**

Conversion of information to data - Collection, compilation and presentation of data - Tables, Graphs, Diagrams - Parametric representation of data - Analytical interpretation of data - Percentage - Highest Common Factor (HCF) - Lowest Common Multiple (LCM) - Ratio and Proportion - Simple interest - Compound interest - Area - Volume - Probability. Puzzles – visual reasoning – alpha numeric reasoning - dice – number series. **General English** - Synonyms & Antonyms - Prefix & Suffix - Fill in the Blanks with Suitable Article & Preposition - Question Tags – Tenses – Voice -Sentence Correction -Comprehension. **தமிழ்** – நாடகக்கலை- இசைக்கலை தொடர்பான செய்திகள்- தமிழ்மொழியில் அறிவியல் சிந்தனைகள் தொடர்பான செய்திகள் - தமிழர்வணிகம் –தொல்லியல் ஆய்வுகள் – கடற்பயனங்கள் தொடர்பான செய்திகள்- உணவேமருந்து – நோய்தீர்க்கும் மூலிகைகள் தொடர்பான செய்திகள்.

Study materials will be provided

REFERENCE BOOKS:-

1. Arihant, Compute Awareness, 2019, Mahendra Publications, Chennai.
2. Success Master, Bank PO Main Examinations, 2019, Mahendra Publications, Chennai.
3. Arihant, How to Crack Test of Reasoning, 2019, Mahendra Publications, Chennai.
4. Arihant, English Grammar and Composition, 2019, Mahendra Publications, Chennai.
5. BS Sijwali, Indu Sijwali, A New Approach to Reasoning, Verbal, Non-Verbal and Analytical, 2019, Mahendra Publications, Chennai.
6. Sura's TNPSC Group – II A, 2017, Sura College of Competition, Chennai.

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THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER VI
PART – III - MAJOR COURSE
BDPH61 – FUNDAMENTALS OF SOLID STATE PHYSICS
(For those who have joined in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial) : 90 (75+15)
Total number of Credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain interatomic forces, unit cells, different types of bonding, semiconductors, wave nature of matter and X- ray diffraction
CO2[K2]: describe about the symmetry elements, different structures based on packing factor, semiconductors, wave nature of matter and X- ray diffraction
CO3[K3]: determine the crystal system, structures, properties of semiconductors, wave nature of matter and X- ray diffraction
CO4[K4]: analyze various lattices, structures, X- ray diffraction patterns and electrical parameters of different types of conductors.
CO5[K5]: evaluate the different parameters of solids, crystals, waves and X-rays to solve problems

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	0	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**37**	**31**	**30**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to Pos	**3.55**	**3.7**	**5.2**	**1.85**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

Inter atomic forces and Bonding in Solids: (15L+3T)

Introduction – Forces between atoms – Cohesion of Atoms and Cohesive Energy – Calculation of Cohesive Energy – Bonding in solids – Ionic bonding – Bond Energy of NaCl Molecule – Calculation of Lattice Energy of Ionic Crystals – Calculation of Madelung Constant of Ionic Crystals – Properties of ionic solids – Examples of ionic solids – Covalent bond – Properties of covalent compounds.

Unit – II

Crystal Physics - I: (15L+3T)

Metallic bond – Properties of metallic crystals-Introduction – Lattice points and space lattice – The basis and crystal structure – Unit cells and lattice parameters – Unit cell versus primitive cell – Crystal systems – Crystal Symmetry (Symmetry Elements in Crystals) – The Twenty Three Symmetry Elements in a Cubic Crystal –The Bravais space lattices –Metallic crystal structures[simple cubic structure(sc),body centered cubic structure(bcc),face centered cubic structure(fcc)] – Other Cubic Structures.

Unit – III

Crystal Physics - II: (15L+3T)

Directions, planes and Miller indices – Important features of Miller indices of crystal planes – Important planes and directions in a cubic crystal – Distribution of atoms in the atomic planes of a simple cubic crystal – Separation between lattice planes in a cubic crystal – Imperfections in crystals (upto Production of Point defects)- Hall effect – Advantages of semiconductor devices.

Unit – IV

Physics of Semiconductors: (15L+3T)

Introduction – The band structure of semiconductors – Semiconductors – Intrinsic semiconductors – Conductivity and temperature – Electrical conductivity – Impurity semiconductors or extrinsic semiconductors – Mechanism of current conduction in semiconductors – Generation and recombination.

Unit – V

Wave Nature of Matter and X-Ray Diffraction (15L+3T)

Introduction – The De Broglie Hypothesis – Experimental study of matter waves – The Davisson-Germer Experiment – Heisenberg's Uncertainty Principle – X-Ray Diffraction – Bragg's law – Bragg's x-ray spectrometer – Powder Crystal Method – Rotating Crystal Method – Correction for Bragg's Equation.

Text Book:

S.O. Pillai - Solid State Physics
New age international (p) limited,publishers
Sixth Revised edition: 2010, Reprint 2012

Reference Book:

Charles Kittel - Introduction to Solid State Physics
John Wiley & Sons, Inc.,
VIII Edition, Reprint 2014

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Bonding in Solids	I	Presentation/ Scrap book/ Video/ Interactive quizzes
Crystal systems	II	Model/ Video/ Interactive quizzes
Miller indices	III	Problems/Presentation / Video/ Interactive quizzes
Semiconductors	IV	Designing circuits / Video/ Interactive quizzes
X-Ray Diffraction	V	Presentation /Video/ Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI

DEPARTMENT OF PHYSICS

B.Sc. PHYSICS

SEMESTER VI

PART – III - MAJOR COURSE

BDPH62 – QUANTUM PHYSICS AND RELATIVITY

(For those who have joined in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 05 (04+01)
Total number of hours per semester(Lecture hour + Tutorial) : 75 (60+15)
Total number of Credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: summarize the basic concepts of quantum physics and relativity
CO2[K2]: describe the origin, general formalism and energy Eigen values of quantum mechanics
CO3[K3]: apply the theories of relativity and quantum Physics to solve simple problems
CO4[K4]: analyse the various laws and hypothesis involved in Special and Theory of Relativity wave mechanics
CO5[K5]: appraise concepts of special theory of relativity and wave mechanics

CO-PO Mapping table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	1	0	0	0
CO2	3	1	1	1	0	0	1
CO3	3	3	1	1	0	0	0
CO4	9	3	3	1	0	0	0
CO5	9	9	3	1	0	0	0
Weightage of the course	**25**	**16**	**8**	**5**	**0**	**0**	**1**
Weighted percentage of Course contribution to Pos	**2.4**	**1.91**	**1.39**	**1.85**	**0**	**0**	**0.63**

Based on the level of contribution (9-High, 3 Medium, 1-Low)

Unit –I

Special theory of relativity **(12L+3T)**

Basic postulates of Special Theory of Relativity -Galilean Transformation is inadequate - New transformation needed - Postulates of special theory of relativity- Lorentz Transformation – The relativistic law of addition of velocities - Kinematic effects of Lorentz transformation - Relativistic generalisation of Newton's Laws - World velocity or four velocity - Four Force and four Momentum - Relativistic Kinetic Energy - Relativistic Mass - Mass-Kinetic Energy Relations.

Unit – II

Origin of the Quantum theory **(12L+3T)**

Limitations of Classical Physics – Planck‟s Quantum Hypothesis – Einstein's Theory of Photoelectric Effect – Compton Effect – Quantum Theory of Specific Heat – Bohr Model of Hydrogen Atom – Existence of Stationary States – Wilson-Sommerfeld Quantization Rule– Elliptic Orbits of Hydrogen Atom – The Harmonic Oscillator – The Rigid Rotator – Particle in a Box – The Correspondence Principle – The Stern-Gerlach Experiment – Inadequacy of Quantum theory.

Unit – III

Concept of wave function **(12L+3T)**

Wave nature of particles – The Uncertainty Principle – The Principle of Superposition – Wave Packet – Time-dependent Schrodinger Equation – Interpretation of the Wave Equation – Ehrenfest's Theorem – Time-independent Schrodinger Equation – Stationary States – Admissibility conditions on the Wave Function.

Unit – IV

General formalism **(12L+3T)**

Linear Vector Space – Linear Operator – Eigen Functions and Eigen Values – Hermitian Operator – Postulates of Quantum Mechanics – Simultaneous measurability of observables - General Uncertainty relation.

Unit – V

One dimensional energy eigen value problems **(12L+3T)**

Square-well Potential with Rigid Walls – Square-well Potential with Finite Walls – Square Potential Barrier – Alpha Emission- Linear Harmonic Oscillator: Schrodinger Method.

Text Books:

Unit – I

1. S.L. Gupta, V. Kumar and H.V. Sharma - Classical Mechanics
   Pragati – Prakashan
   Publications. Twenty-
   Fourth Edition, 2010

Units – II, III, IV and V

2. G. Aruldhas – Quantum Mechanics
   Prentice-Hall of India Private Limited, Second Edition, 2012.

Reference Books:

1. P. M Mathews and K. Venkatesan - A Text Book on Quantum Mechanics, Tata McGraw Hill Education Private Limited New Delhi, Second Edition, 2010.
2. John L. Powell and Crasemann - Quantum Mechanics Narosa Publishing House Ninth Reprint, 1998

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Basic postulates of Special Theory of Relativity	I	Presentation /Video
Einstein's Theory of Photoelectric Effect, The Stern-Gerlach Experiment, Inadequacy of Quantum theory	II	Mind Map/Video/ Interactive quizzes
Wave nature of particles, The Principle of Superposition	III	Presentation/Video/Interactive quizzes
Postulates of Quantum Mechanics	IV	Presentation /Mind Map
Square Potential Barrier, Alpha Emission	V	Presentation/Video

Marks are recorded for each student in each learning activity and which can be taken as Assignment marks.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER VI
PART – III - MAJOR COURSE
BDPH6L – PHYSICS LAB - II
(Any 20 Experiments)
(For those who have joined in June 2020 and later)

Contact hours per week : 06
Total number of hours per semester : 90
Total number of Credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain the principles of the experiments
CO2[K3]: construct electronic and non-electronic circuits
CO3[K3]: determine the physical parameters through various experimental techniques
CO4[K4]: analyze the data and interpret appropriate conclusions
CO5[K5]: evaluate the experimental results with laboratory ethics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	3	0	0	1
CO2	9	3	9	3	0	0	1
CO3	9	9	9	3	0	0	1
CO4	9	9	9	9	0	0	1
CO5	0	0	0	0	0	3	1
Weightage of the course	**30**	**21**	**27**	**18**	**0**	**3**	**5**
Weighted percentage of Course contribution to Pos	**2.88**	**2.51**	**4.68**	**6.64**	**0**	**2.1**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

List of Experiments:

1. Computer programming – Theory of Relativity (Any 2 Pbms)
2. Computer programming - Linear Harmonic Oscillator
3. Computer Programming –Energy Level Calculation in Hydrogen Atom
4. Small Angled Prism
5. Prism – I – I''
6. Resolving power of a telescope
7. Dispersive power of a grating
8. Newton's rings
9. B – H curve (Hysteresis loop-I $\propto \theta$)
10. Zeeman effect
11. Fabry – Perot interferometer
12. Photoelectric effect (Determination of Plank's constant)
13. Michelson interferometer (Piezoelectric effect)
14. Comparison of Mutual Inductance using B.G
15. Absolute Capacitance Using B.G
16. High Resistance by Leakage
17. RS Flip Flop Using NOR Gate
18. D Flip Flop Using NOR Gate
19. Low pass filter using Discrete Components
20. High pass filter using Discrete Components
21. Band Pass Filters Using Discrete Components
22. Astable multivibrator using IC 555
23. Monostable multivibrator using Timer 555
24. Bistable multivibrator – JK FF
25. Counter – MOD 5, MOD 7
26. Register – Ring Counter
27. Decade counter

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER VI
PART – III - MAJOR COURSE
BDPH6P – PROJECT
(For those who have joined in June 2020 and later)

Contact Hours per Week : 03
Total number of Hours per Semester : 45
Total number of Credits : 03

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: describe the principles behind the physics related problem
CO2[K3]: implement the basic principles of physics in exploring new avenues
CO3[K3]: solve physics problems using qualitative and quantitative reasoning including sophisticated mathematical techniques
CO4[K4]: organize the results of the study in written form
CO5[K6]: design and conduct scientific studies for specific purposes

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	3	3	1
CO2	9	3	3	3	3	3	1
CO3	9	9	9	3	3	3	1
CO4	9	9	9	3	3	3	1
CO5	9	9	9	3	3	3	1
Weightage of the course	**37**	**33**	**33**	**12**	**15**	**15**	**5**
Weighted percentage of Course contribution to Pos	**3.55**	**3.94**	**5.72**	**4.43**	**17.44**	**10.49**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Rules governing Project Report

1. During sixth semester, the students have to undertake a group project by selecting a problem of their choice pertaining to this discipline. Each group shall contain a maximum of four students.
2. Two copies of the project report with 20-40 pages excluding appendices should be submitted on or before the last working day of the students.

3. The project report shall be evaluated by the guide and the external examiner for 50 marks. The *Viva-voce* examination shall be conducted jointly by the guide and external examiner for 50 marks.
4. For a pass in the project, each student should secure a minimum of 40% of marks.
5. If a student fails to get a minimum pass mark, she may be permitted to resubmit her project report once again within the period of six months after the publication of results.
6. If a student fails to submit the project report within the stipulated time, the candidate can submit the same after getting permission from the Chief Controller of Examinations along with the fine.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER VI
PART – III - MAJOR ELECTIVE COURSE
BDPH6E1- THERMODYNAMICS AND STATISTICAL THERMODYNAMICS
(For those who have joined in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 05 (04+01)
Total number of hours per semester(Lecture hour + Tutorial) : 75 (60+15)
Total number of Credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain the properties of thermodynamic systems, the laws governing them and basics of statistical thermodynamics
CO2[K2]: describe the energy equation, entropy changes, thermodynamic potentials and different types of statistical distribution functions
CO3[K3]: use the laws of thermodynamics to determine heat flow, change in entropy and thermodynamic probability using MB, BE and FD statistics
CO4[K4]: analyze the properties of gases, phase transitions in closed and open systems and different kinds of statistical systems
CO5[K5]: evaluate thermodynamic properties using laws of thermodynamics and statistical thermodynamics.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	0	0	1
CO2	9	3	3	0	0	0	1
CO3	9	9	9	0	0	0	1
CO4	9	9	9	0	0	0	1
CO5	9	9	9	0	0	0	1
Weightage of the course	**37**	**33**	**33**	**0**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.55**	**3.94**	**5.72**	**0**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

Thermodynamic Systems and the first law (12L+3T)

Scope of thermodynamics -Thermodynamic systems -State of a system -pressure- thermal equilibrium and temperature- The Zeroth law- thermodynamic thermodynamic

equilibrium- The first law of thermodynamics – Some consequences of the first law - The energy equation – T and v independent – T and P independent - P and v independent.

Unit –II

Entropy and the second law of Thermodynamics (12L+3T)

The second law of thermodynamics – Thermodynamic temperature- Entropy – calculation of entropy changes in reversible process - Temperature – entropy diagrams – entropy changes in irreversible processes – The principle of increase of entropy - Clausius and Kelvin – Plank statement of the second law

Unit - III

Combined I and II law (12L+3T)

Combined I and II law – T and v independent – T and P independent – P and v independent – The T dS equations- properties of a pure substance – Properties of an ideal gas- Properties of a Vander Waals gas.

Unit – IV

Thermodynamic Potentials (12L+3T)

The Helmoholtz function and the Gibbs function- Thermodynamic potentials- The Maxwell's relations – stable and unstable equilibrium – phase transitions – the Clausius-Clapeyron equation- The third law of thermodynamics.

Unit – V

Statistical Thermodynamics (12L+3T)

Introduction- energy states and energy levels- macrostates and microstates – thermodynamic probability – The Bose-Einstein statistics –Fermi-Dirac statistics – Maxwell-Boltzmann statistics – The statistical interpretation of entropy – Bose-Einstein distribution function- Fermi-Dirac distribution function – Maxwell-Boltzmann distribution function

Text Book:

1) Francis W. Sears and Gerhard L. Salinger - Thermodynamics, Kinetic theory and Statistical thermodynamics, Narosa Publishing House, Third edition, Nineth Reprint 1998

Reference Books:

1. N.Subrahmanyam and Brijlal - Heat and Thermodynamics, S.Chand and company Limited, edition 8, (2002)
2. M.N.Saha and B.N.Srivastava - A treatise on heat, 3rd edition, Published by The Indian Press.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Thermodynamic systems	I	Interactive Quizzes /Demo
Principle of increase of entropy	II	Debate
Properties of substances using T-dS equations	III	Case Study/Presentation/Debate
Stable and unstable equilibrium	IV	Mind Maps/ Interactive Quizzes Presentation
Macrostates and microstates	V	Demo/Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. PHYSICS
SEMESTER VI
PART – III - MAJOR ELECTIVE COURSE
BDPH6E2 – INSTRUMENTATION TECHNIQUES
(For those who have joined in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 05 (04+01)
Total number of hours per semester(Lecture hour + Tutorial) : 75 (60+15)
Total number of Credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain the separation techniques, principles of spectroscopy, crystallography and biosafety
CO2[K2]: describe the features of spectroscopy, crystallography, separation techniques and biosafety
CO3[K3]: apply NMR spectroscopy in chemistry, biochemistry and biophysics
CO4[K4]: analyze crystal structures, XRD data, NMR data
CO5[K5]: interpret the types of laboratory safety

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	0	0	1
CO2	9	3	3	0	0	0	1
CO3	9	9	9	0	0	0	1
CO4	9	9	9	0	0	0	1
CO5	9	9	9	0	0	0	1
Weightage of the course	**37**	**33**	**33**	**0**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.55**	**3.94**	**5.72**	**0**	**0**	**0**	**3.14**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

UNIT I **(12L+3T)**

Separation Techniques

Introduction – Chromatography – Electrophoresis. Physico-Chemical Techniques to study Bio molecules: Introduction – Hydration of Macro Molecules – Role of Friction – Diffusion – Sedimentation – The ultra centrifuge – Viscosity – Rotational diffusion – Light scattering – Small Angle X-ray scattering.

UNIT II **(12L+3T)**

Spectroscopy

Introduction – Ultra violet/Visible Spectroscopy – Circular Dichroism(CD) and Optical Rotatory Dispersion (ORD) – Fluorescence Spectroscopy – Infra Red Spectroscopy – Raman Spectroscopy – Electron spin Resonance. Light Microscopy: Introduction – Elementary Geometrical Optics – The limits of Resolution – Different types of Microscopy.

UNIT III **(12L+3T)**

X-ray Crystallography:

Introduction – Crystals and Symmetrics – Crystal systems – Point groups and Space groups – Growth of Crystals of Biological molecules – X-ray Diffraction – X-ray Data collection – Structure solution – Refinement of the structure – Note on the resolution of an X-ray structure.

UNIT IV **(12L+3T)**

NMR Spectroscopy:

Introduction – Basic Principles of NMR – NMR theory and experiment – Classical Description of NMR – NMR parameters – The nuclear overhauser Effect – NMR applications in chemistry – NMR applications in Biochemistry and Biophysics – NMR in medicine. Molecular modelling: Introduction – Generating the model – Optimizing the model.

UNIT V **(12L+3T)**

Biosafety:

General lab safety- emergency management -waste management - chemical safety – biosafety- radiation safety- laser safety- compressed gas safety- fume hood safety- personal protective equipment- electrical safety- biosafety cabinets and laminar hoods- local exhaust ventilation- laboratory ventilation- water protection-illumination, temperature and noise regulations- instruments- biological safety levels- gel room safety- dark room and radioisotope room safety.

Text Book :

Vasantha Pattabhi & N Gautham - Biophysics
Narosa Publishing House
First Reprint 2003
New Delhi Chennai Mumbai Kolkata

Reference Books:

1. P. Narayanan – Essentials of Biophysics
New Age Internationals, Second edition, India
Reprint 2005.

2.Vasantha Pattabhi, N.Goutham - Biophysics
Narosa Publisher, Second edition,2009.

3. Fevzi Cakmak Cebezi - Laboratory Safety Handbook, Sabanci University, First edition, 2016

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Separation Techniques	I	Interactive Quizzes /Demo
Different types of Microscopy	II	Debate
Crystal systems	III	Presentation/Album
NMR applications in Biochemistry and Biophysics	IV	Mind Maps/ Interactive Quizzes Presentation
Biosafety	V	Demo/Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER I
PART – III - ALLIED COURSE - I
BDPH1A – FUNDAMENTAL PHYSICS
(FOR MATHEMATICS AND CHEMISTRY)
(For those who have joined in June 2020 and later)

Contact Hours per week (Lecture hour + Tutorial) : 04 (03+01)
Total number of Hours per Semester(Lecture hour + Tutorial) : 60 (45+15)
Total number of Credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: summarize the basics of photo electricity, transport properties of gases, laws and parameters involved in electricity, rotational motion and gravitational laws
CO2[K2]: explain photo electric cells, Boy's experiment, laws related to electricity and gravitation
CO3[K3]: solve simple problems related to photo electricity, kinetic theory of gases, rotational motion, electricity and gravitation
CO4[K4]: analyze photoelectricity with respect to various parameters, 'g' using compound pendulum and compare the variation of 'g' with respect to latitude, depth and altitude
CO5[K5]: evaluate transport properties of gases, gravitational parameters, electric field for different charge distributions and parameters of rotational motion

CO-PO Mapping table (Course Articulation Matrix)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	1	0	0	1
CO2	3	3	0	1	0	0	1
CO3	3	9	0	1	0	0	1
CO4	9	9	0	1	0	0	1
CO5	9	9	0	1	0	0	1
Weightage of the course	**27**	**30**	**0**	**5**	**0**	**0**	**5**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit-I **(9L+3T)**

Photo electricity:

Laws of Photo electricity – Einstein's equation - Photocells and their uses - Photo Emissive cell- Photo Conductive cell – Photo Voltaic cells – Solar cells – Photo detectors.

Unit – II **(9L+3T)**

Kinetic theory of gases:

Mean free path –Expression for the Mean free path - Diffusion - Expression for Diffusion –Viscosity - Expression for the Viscosity - Thermal Conductivity - Expression for the Thermal Conductivity.

Unit-III **(9L+3T)**

Gauss law and its applications:

Coulomb's law - Electric field - Electric field due to a point charge - Lines of force - Flux of the electric field - Gauss law - Electric field due to a uniformly charged sphere – Electric field due to a uniform infinite cylindrical charge.

Unit-IV **(9L+3T)**

Rotational motion:

Angular velocity – Normal acceleration - Centripetal and Centrifugal forces – Torque and Angular Acceleration - Work and power in Rotational motion - Angular momentum – Angular impulse-KE of Rotation - Moment of inertia - Laws of parallel and perpendicular axes theorems.

Unit – V **(9L+3T)**

Gravitation:

Newton's Law of gravitation - Kepler's laws of Planetary motion – Determination of G-Boys' Experiment- Variation of g with Latitude or rotation of the earth - Variation of g with Altitude - Variation of g with Depth – The Compound Pendulum - Expression for period – Equivalent Simple pendulum- Minimum time of oscillation of a compound pendulum- Determination of g with compound pendulum.

Text Books:

Unit-I

1.N.Venkatachalam – Ancillary Physics
Optics Spectroscopy and Modern Physics (2003)

Unit- II, Unit -IV

2.R. Murugeshan - Mechanics, Properties of Matter and Sound, Thermal Physics (2002).

Unit- III

3. R. Murugeshan - Electricity and Magnetism, S.Chand and company ltd, Reprint 2008

Unit–IV

4.M. Palaniappan - Ancillary Physics, L.M.N. Publications, Madurai (1999)

Unit–V

5. R. Murugeshan - Properties of Matter(1994), S. Chand and company ltd, New Delhi.

Reference Books:

2. University Physics with Modern Physics – Sears & Zemansky, Pearson Publishers, 14th Edition.
3. Elements of Properties of matter - D.S.Mathur, S.Chand & Company Pvt Ltd, Reprint, 2014.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Photo cells	I	Scrap book/ Video/ Interactive quizzes
Kinetic Property of gases	II	Presentation/Video/ Interactive quizzes
Uniform charged distribution	III	Presentation / Video/ Interactive quizzes
Centripetal and Centrifugal forces	IV	Presentation / Video/ Interactive quizzes
Boys' Experiment	V	Presentation /Video/ Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
B.Sc. MATHEMATICS
SEMESTER- II
PART – III - ALLIED COURSE - II
BDPH2A1 - DIGITAL ELECTRONICS
(For those who have joined in June 2020 and later)

Contact Hours per Week (Lecture hour + Tutorial) : 04 (03+01)

Total number of Hours per Semester (Lecture hour + Tutorial) : 60 (45+15)

Total number of Credits : 04

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain the basic principles in digital systems.
CO2[K2]: describe logic gates, karnaugh map, flip flops, and arithmetic circuits.
CO3[K3]: apply digital logic principles to simplify simple circuits, convert number system and codes.
CO4[K4]: analyze circuits for various arithmetic and logic operations.
CO5[K5]: interpret the functioning of gates, combinational logic circuits, number systems and flip flops

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	1	0	0	0
CO2	3	3	3	1	0	0	0
CO3	9	3	9	1	0	0	0
CO4	9	9	9	1	0	0	0
CO5	9	9	9	1	0	0	0
Weightage of the course	**31**	**27**	**33**	**5**	**0**	**0**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit – I

Number System and Codes : (9L+3T)

Binary number system – Binary to Decimal Conversion - Decimal to Binary Conversion –

Octal numbers - Hexadecimal numbers - The ASCII Code – Excess 3 code – Gray Code.

Unit – II

Arithmetic Circuits: (9L+3T)

Binary Addition - Binary Subtraction - 2‟s complement representation – 2‟s complement Arithmetic - Arithmetic building blocks – The Adder-Subtracter.

Unit – III

Digital Logic **(9L+3T)**

The basic gates – The AND gate – The OR gate – The NOT gate – The NOR gate – The NAND gate.

Unit – IV

Combinational Logic Circuits **(9L+3T)**

Boolean Laws and theorem – OR operation – AND operation - Double Inversion and De Morgan‟s theorems - Duality theorem - Sum Of Products methods – Truth table to Karnaugh Map - Pairs, Quads and Octets - Karnaugh Simplifications - Don‟t care conditions – Product Of Sum method - Product Of Sum Simplifications.

Unit – V **(9L+3T)**

Flip – Flops:

RS Flip-Flop – Clocked RS flip flop – Clocked D flip flop - Edge triggered RS flip flop (positive edge triggered) - Edge triggered D flip flop (positive edge triggered).

Text Book:

Donald P. Leach& Albert Paul Malvino - Digital Principles and Applications
Tata McGraw – Hill
Publishing Company
Limited, New Delhi.
Sixth Edition 2002

Reference books:

1. S.K. Mandal - Digital Electronics, 1st Edition
   Tata Mc Grawhill Education Pvt Ltd, New Delhi.(2017)
2. V.K. Puri - Digital Electronics circuits and systems,
   Tata Mc GrawHill Education Pvt Ltd, 23rd reprint (2012)

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Number System and Codes	I	Video/ Interactive quizzes/ Problems
Arithmetic Circuits	II	Problems/Video/ Interactive quizzes
Logic gates	III	Presentation / Video/ Interactive quizzes
Boolean Laws and theorem	IV	Presentation / Interactive quizzes/video
Flip – Flops	V	Presentation /Video/ Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER II
PART – III - ALLIED COURSE - II
BDPH2A2 –SOLID STATE PHYSICS & DIGITAL ELECTRONICS
(FOR CHEMISTRY)
(For those who have joined in June 2020 and later)

Contact Hours per Week (Lecture hour + Tutorial) : 04 (03+01)
Total number of Hours per Semester (Lecture hour + Tutorial): 60 (45+15)
Total number of Credits : 04

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain the concepts of crystal structures, X-ray diffraction, semiconductors and logic gates.
CO2[K2]: describe the different crystal structures, XRD methods, types of semiconductors and logic gates.
CO3[K3]: apply different methods to simplify the equations and construct combinational logic circuits
CO4[K4]: analyze crystal structures, semiconductors and combinational logic circuits
CO5[K5]: evaluate lattice parameters, prove digital logic laws and truth tables of logic gates.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	1	1	0	0	0
CO2	3	3	1	1	0	0	0
CO3	3	3	3	1	0	0	0
CO4	9	9	3	1	0	0	0
CO5	9	9	3	1	0	0	0
Weightage of the course	**25**	**27**	**11**	**5**	**0**	**0**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit-I

Crystal Structure: (9L+3T)

Introduction - Crystal lattice and Translation vectors – Unit cell – Basis -Symmetry Operations – Point groups and Space groups – Types of lattices – Lattice directions and planes – Interplanar spacing – Structure of diamond, Zinc Blende and Sodium Chloride.

Unit-II

X-Ray Diffraction: (9L+3T)

Introduction – X-Ray Diffraction - Bragg's law - Laue's Equations – X Ray Diffraction methods - The Laue's method - Rotating Crystal Method - Powder method.

Unit – III

Semiconductors: (9L+3T)

Introduction - Pure or Intrinsic semiconductors- Impurity or Extrinsic semiconductors - Donor or N type semiconductor - Acceptor or P type semiconductor.

Unit – IV

Digital Logic (9L+3T)

The basic gates – The AND gate – The OR gate – The NOT gate – The NOR gate – The NAND gate.

Unit – V

Combinational Logic Circuits (9L+3T)

Boolean Laws and theorem – OR operation – AND operation - Double Inversion and De Morgan's theorems - Duality theorem - Sum Of Products methods – Truth table to Karnaugh Map - Pairs, Quads and Octets - Karnaugh Simplifications - Don't care conditions – Product Of Sum method - Product Of Sum Simplifications

Text Book:

Unit I, Unit II & Unit III

1. Solid State Physics and Electronics - R.K.Puri& V.K.Babbar
   First Edition 1997.

Unit – IV & Unit – V

2. Donald P.Leach & Albert Paul Malvino - Digital Principles and Applications
   Tata McGraw – Hill Publishing Company Limited, New Delhi.
   Sixth Edition 2002

Reference Book :

1. S.O. Pillai - Solid State Physics
   New age International limited,
   Revised Sixth Edition 2005
2. Dr.G.Senthil Kumar - Engineering Physics – I
   VRB Publishers Pvt.Ltd.
   Revised & Animated Version 2012-2013.
3. S.K. Mandal - Digital Electronics,
   Tata Mc Grawhill Education Pvt Ltd, New Delhi.
4. V.K. Puri - Digital Electronics circuits and systems,
   Tata Mc GrawHill Education Pvt Ltd, 23rd reprint (2012)

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Structure of diamond, Zinc Blende and Sodium Chloride.	I	Model/Scrap book/ Video/ Interactive quizzes
X Ray Diffraction methods	II	Presentation/Video/ Interactive quizzes
Semiconductors	III	Presentation / Video/ Interactive quizzes
Logic gates	IV	Designing circuits / Video/ Interactive quizzes
K-map simplification	V	Problems /Video/ Interactive quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER II
PART – III - ALLIED COURSE
BDPH2AL – FUNDAMENTAL PHYSICS LAB
(FOR B.Sc MATHEMATICS AND CHEMISTRY)
(Any 16 experiments)
(For those have joined in June 2020 and later)

Contact hours per week : 02
Total number of hours per semester : 30
Total number of Credits : 02

Course Outcomes (CO):

On successful completion of the course, the learners should be able to
CO1[K2]: explain the principle of the experiment
CO2[K3]: construct electronic and electrical circuits
CO3[K3]: determine the physical parameters by performing the experiments.
CO4[K4]: analyze the physical parameters both manually and graphically
CO5[K5]: evaluate the obtained results following the laboratory ethics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	0	1	3	3	0
CO2	3	3	0	1	3	3	0
CO3	9	9	9	1	3	3	0
CO4	9	9	9	1	3	3	0
CO5	9	9	9	1	3	3	0
Weightage of the course	**31**	**33**	**27**	**5**	**15**	**15**	**0**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

List of Experiments
1. Determination of resistance and resistivity using Carey Foster's Bridge
2. Comparison of Capacitances using De Sauty's Bridge
3. Calibration of Ammeter using Potentiometer
4. Calibration of Low range voltmeter using Potentiometer
5. Comparison of e.m.fs of two given cells using Potentiometer
6. Comparison of capacitances of two given capacitors using Potentiometer
7. Verification of Boolean Laws using gates
8. Construction and study of RS Flip Flop Using NOR Gate

9. Construction and study of D Flip Flop Using NOR Gate
10. Bridge Rectifier – Measurement of input and output voltages
11. Zener diode characteristics
12. Junction diode characteristics
13. Construction and study of AND, OR and NOT gates using discrete components
14. Construction and study of AND, OR and NOT gates using NAND gate
15. Construction and study of AND, OR and NOT gates using NOR gate
16. Verification of De Morgan's Theorems using gates
17. Single Stage Amplifier
18. Adder using Operational amplifier.
19. Subtractor using Operational Amplifier
20. Series Resonance
21. Parallel Resonance
22. IC regulated power supply 0 – 5V
23. Transistor Characteristics
24. Photodiode Characteristics
25. Compound Pendulum

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER IV
PART – IV – ABILITY ENHANCEMENT COURSE
NON MAJOR ELECTIVE COURSE
BDPH4N – BASICS OF SOLAR ENERGY
(For those who have joined in June 2020 and later)

Contact Hours per Week : 02
Total number of Hours per Semester : 30
Total number of Credits : 02

Course Outcomes (CO):

On successful completion of the course, the learners should be able to
CO1[K2]: describe solar radiation, solar based devices and systems.
CO2[K2]: explain the types of solar energy and solar energy devices.
CO3[K3]: apply the principles of solar energy to solve problems.
CO4[K3]: construct solar water heater, solar cooker, solar air heater, solar stills and solar cells.
CO5[K5]: comment on solar energy/solar devices, its applications, merits and demerits.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	0	3	0	0	0
CO2	3	1	0	3	0	0	0
CO3	3	3	0	3	0	0	0
CO4	3	0	0	0	0	0	0
CO5	3	0	0	0	0	0	0
Weightage of the course	**13**	**7**	**0**	**9**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I **(10 hrs)**

Solar energy

Energy – renewable energy sources and its advantages – non renewable energy sources and its advantages.

An introduction to solar energy and its prospects – solar radiation – measurement of solar radiation – applications of solar energy.

Solar water heating system

Solar water heating system – Conventional hot water system for domestic use and its classification – advantages – applications.

Unit II

Solar cooker **(10 hrs)**

Introduction – flat plate box type solar cooker with or without reflector – multi reflector type solar oven – parabolic disc concentrator type solar cooker – box type solar cooker – thermal analysis – merits and demerits.

Solar air heaters

Solar air heaters – classification – advantages & disadvantages.

Unit III

Solar desalination **(10 hrs)**

Introduction – basin type solar still – basics of solar still – material problems in solar still – wick type solar still – multiple wick type solar still – solar disinfection.

Solar photovoltaics

Introduction – Semiconductor principles – photovoltaic principles – a basic photovoltaic system for power generation – advantages and disadvantages of photovoltaic solar energy conversion – applications.

Text Book:

Study material will be provided

Reference Books:

1. G.D. Rai - Solar energy Utilization, Kanna Publishers, 1987
2. S.P.Sukhatme, J.K.Nayak - Solar energy The Mc Graw Hill Company, Third Edition
3. G.N.Tiwari - Solar energy CRC Press, 2002
4. H.P.Garg, J.Prakash - Solar energy : Fundamentals and Applications Tata McGraw Hill Company Limited, 2000

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
SEMESTER V
PART-IV – ABILITY ENHANCEMENT COURSE
NON - MAJOR ELECTIVE COURSE
BDPH5N – PHYSICS FOR THE NEW WORLD
(For those who have joined in June 2020 and later)

Contact hours per week : 02
Total number of hours per semester : 30
Total number of number of credits : 02

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the basics of lasers, ultrasonics, electrical safety
CO2[K2]: describe the applications of lasers, ultrasonics, satellites and global positioning system
CO3[K3]: classify the ordinary light and laser beam, single phase supply and three phase supply, ultrasonic scanning methods and different types of satellites
CO4[K4]: analyze the effects of lightning and electric shock
CO5[K5]: appraise the functions of ultrasonic flaw detector, sonograms, earthing, Satellites and global positioning system

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	0	3	0	0	0
CO2	3	1	0	3	0	0	0
CO3	3	3	0	3	0	0	0
CO4	3	0	0	0	0	0	0
CO5	3	0	0	0	0	0	0
Weightage of the course	**13**	**7**	**0**	**9**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

Laser and Its Applications **(10hrs)**

Introduction – Characteristics of laser – Differences between ordinary light and laser beam – Engineering and medical applications of laser – Industrial applications.

Ultrasonics and Its Applications

Introduction **–** Industrial applications of ultrasonics – Ultrasonic flaw detector – Ultrasonic scanning methods – Applications of ultrasonics in medical field – Sonograms.

Unit – II

Electrical Safety **(10hrs)**

Single phase supply – Three phase supply – Earthing for safety– Lightning arrestor for buildings – Treatment of electric shock.

Unit – III

Satellite Communication **(10hrs)**

Introduction – Basics – Applications of satellites – communication satellites – Design considerations – Types of satellites.

Global Positioning System

Introduction – Working of global positioning system – How GPS determines a position – Sources of errors – GPS receiver.

Text Book:

Study material will be provided.

Reference books:

1. G. Senthil Kumar - Engineering Physics-I, VRB Publishers Pvt. Ltd, Chennai, New and Animated version, 2013.

2. B. Raja Rao - Electricity Technical Books Publishers, Chennai. Second Edition, 2000.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER VI
PART – IV- ABILITY ENHANCEMENT COURSE
SKILL BASED COURSE
SELF EMPLOYMENT COURSE
BDSE66 – DOMESTIC ELECTRICAL APPLIANCES SERVICING
(For those who have joined in June 2020 and later)

Contact hours per week : 02
Total number of Hours per Semester : 30
Total number of Credits : 02

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: summarize the basic electrical and electronic parameters
CO2[K2]: describe the basic household wiring, types of earthing, electrical devices and appliances
CO3[K3]: determine various electrical parameters
CO4[K4]: analyze the colour coding of resistors and working of domestic electrical appliances
CO5[K5]: interpret the possible defects in household appliances

CO-PO Mapping table (Course Articulation Matrix)

Pos / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	3	0	0	0
CO2	3	1	0	3	0	0	0
CO3	3	3	0	3	1	0	0
CO4	9	1	0	0	1	0	3
CO5	3	9	0	0	1	0	3
Weightage of the course	**19**	**14**	**0**	**9**	**3**	**0**	**6**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I **(10 Hrs)**

Basics of Electricals:

Voltage, current, power, energy and their units – Energy calculations

Basics of Electronics:

Resistor, Color coding of resistor, Diode, Regulator IC, Bridge Rectifier, Power supply Board. Phase – Neutral – Earth – Necessity of Earthing – Difference between Earth and Neutral-Methods of Earthing – Types of Earthing – Types of Fuses

Unit II **(10 Hrs)**

Transformer – Current Transformer – Potential Transformer – Types of wiring – Classification of Cell – Comparison of primary and secondary cell – Defects of Batteries – Care and maintenance of battery

Fluorescent lamp – Circuit diagram – Working – Defects and Servicing

Unit III **(10 Hrs)**

Capacitor start induction motor(Grinder) - Circuit diagram – Working – Defects and Servicing - Permanent Capacitor induction motor (Ceiling Fan) - Circuit diagram – Working – Defects and Servicing – Universal motor (Mixie) - Circuit diagram – Working – Defects and Servicing

Text Book:

Study material will be provided

Reference Books:

1. A.K.Sawhney - A Course in Electrical and Electronic measurements and Instrumentation, Education and technical Publishers, Reprint 1985, Fifh edition.

2. Prithwiraj Purkait, Budhaditya Biswas - Electrical and Electronic measurements and Instrumentation, Mc Graw Hill Education (India) Private Limited, New Delhi

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN(AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER VI
PART – IV- ABILITY ENHANCEMENT COURSE
SKILL BASED COURSE
SELF EMPLOYMENT COURSE
BDSE66L – DOMESTIC ELECTRICAL APPLIANCES SERVICING - LAB
(ANY 12 EXPERIMENTS)
(For those who have joined in June 2020 and later)

Contact hours per week : 02
Total number of Hours per Semester : 30
Total number of Credits : 02

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: describe the working principles of various appliances
CO2[K3]: carry out the basic household wiring and service the household appliances
CO3[K3]: construct different electrical circuits
CO4[K4]: analyze the colour coding and various electrical parameters
CO5[K5]: deduct the defects in the electrical appliances

CO-PO Mapping table (Course Articulation Matrix)

Pos / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	3	0	0	0
CO2	3	1	0	3	0	0	0
CO3	3	3	0	3	1	0	0
CO4	9	1	0	0	1	0	3
CO5	3	9	0	0	1	0	3
Weightage of the course	**19**	**14**	**0**	**9**	**3**	**0**	**6**

List of Experiments:

1. Connect Voltmeter, Ammeter and take Load current
2. Connect Energy meter and calculate Energy
3. Color Coding of given Resistors

4. Soldering of given Components
5. Construct Bridge Rectifier and take the waveform from CRO
6. To wire switch box
7. To wire two lamps in series and parallel and test it
8. To wire staircase wiring and test it
9. To wire Dim and Bright circuit and test it
10. To connect and test the fluorescent lamp
11. To connect and run ceiling fan
12. To connect the single phase induction motor by using DOL starter
13. Practice in servicing mixies
14. Practice in servicing Grinders
15. Practice in servicing Iron boxes.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN
(AUTONOMOUS)

(Reaccredited with 'A' Grade by NAAC,
College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH Scheme)
SIVAKASI – 626 123

Affiliated to Madurai Kamaraj University, Madurai

Programme Scheme, Scheme of Examination and Syllabi
(With effect from **June 2020**)

DEPARTMENT OF PHYSICS

PG AND CERTIFICATE PROGRAMME

Curriculum Design & Development Cell

CHAIRPERSON	DEAN CDDC	DEAN ACADEMIC AFFAIRS	COE
1/9/2020	B. Dh. (B. DEEPA)	CDAA 21/09/20	E. Ponnalar 30/9/2020.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI – 626 123.

(Affiliated to Madurai Kamaraj University, Re-accredited with A Grade by NAAC,
College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH Scheme)

DEPARTMENT OF PHYSICS
M.Sc DEGREE PROGRAMME IN PHYSICS

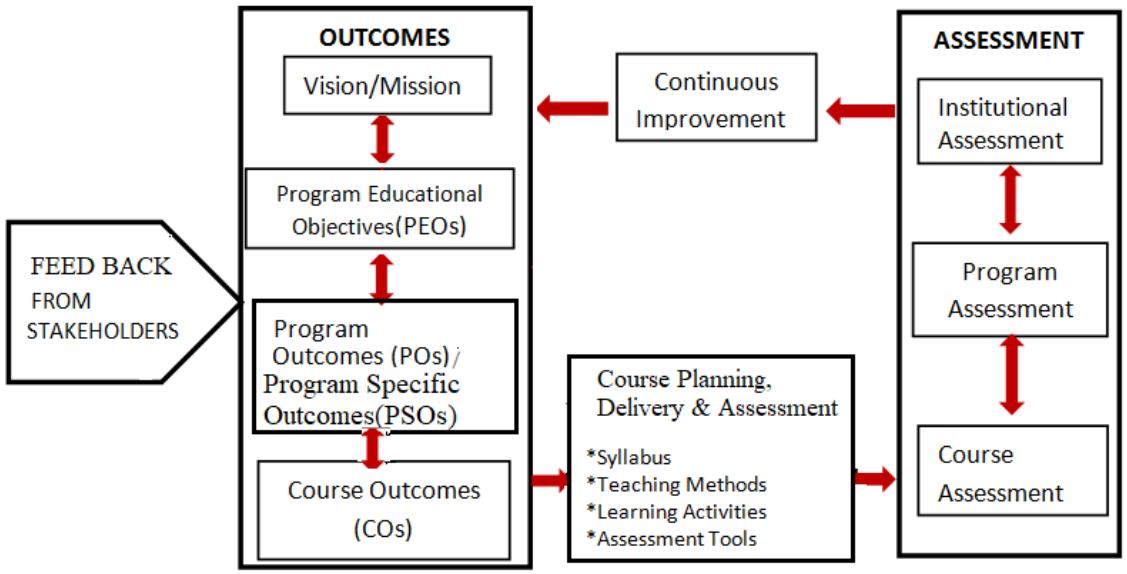
GUIDELINES FOR OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM
(For those who have joined in June 2020 and later)

I. A. PREAMBLE

The institutional vision is to emerge as a premier institution offering need-based, value conscious and career-oriented quality education to empower rural women with communicative competency and employment potential. With the advent of Autonomy in the year 2005, Choice Based Credit System (CBCS) is followed and it offers much flexibility to innovate and design the contents of each programme and align it with the institutional mission. Quality assurance developments in higher education have encouraged us to move towards outcomes-based approach to teaching, learning and assessment. Programme specifications define the students in terms of what they can do at the end of a programme or a particular level of study. This is a change from the more traditional approach where teachers tended to define courses in terms of what is taught, rather than what the student can do at the end of the course or programme. More directed and coherent curriculum, "more relevant" Graduates to industry and other stakeholders and Continuous Quality Improvement (CQI) are the benefits of OBE.

A student-centered paradigm in higher education entails a shift from a more input-oriented curricular design based on the description of course content, to outcomes-based education in which the course content is developed in terms of learning outcomes. The implementation of **Outcome Based Education with CBCS** as per the UGC guidelines from the academic year 2019-2020 will definitely mark a paradigm shift from traditional education.

B. OUTCOME BASED EDUCATION (OBE) FRAMEWORK



C. PROGRAMME EDUCATIONAL OBJECTIVES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Programme Educational Objectives (PEOs):

PEOs are broad statements that describe the career and professional achievements that the programme is preparing the graduates to achieve within the first few years after graduation. PEOs should be consistent with the mission of the Institution. PEO's can be measured by a PO-PEO matrix. The PEO's should evolve through constant feedback from alumnae, students, industry, management etc,. It is mandatory that each PEO should be mapped to atleast one of the POs.

The Graduates will

PEO1: become competent professional in industry, consultancy, education, research and public administration.

PEO2: excel as Junior Research Fellow, research associates, analyze complex problems and experimental data in physics imbibed by ethical, moral and social values leading to highly cultured and civilized physicist.

PEO3: become tutors, tech or digital entrepreneur and undertake projects.

Programme Outcomes (PO):

Programme Outcomes are narrower statements that describe what students are expected to know and be able to do upon the graduation. These relate to the skills, knowledge and behaviour that students acquire in their study through the programmes.

PO1: Disciplinary knowledge

Apply the knowledge of Arts, Science and Humanities to address fundamental and complex questions appropriate to their programmes.

PO2: Critical thinking, Problem solving and Analytical reasoning

Make use of appropriate knowledge and skills to identify, formulate, analyze and solve problems in order to reach substantiated conclusions.

PO3: Research related skills and scientific reasoning

Critically analyze research processes, products and practices with a view of strategic use of data in their field.

PO4: Communication skills and Digital literacy

Demonstrate skills in oral and written communication and make use of ICT in various learning ambience.

PO5: Team work and Leadership quality

Interact productively with people from diverse backgrounds as both leaders/mentors and team members with integrity and professionalism.

PO6: Multicultural competence with Moral and ethical awareness

Defend the society against gender and environmental issues with moral and ethical awareness.

PO7: Self-directed and Life-long learning

Formulate their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

Programme Specific Outcomes (PSO):

Programme Specific Outcomes denote what the students should be able to do at the time of graduation. They are programme specific. It is mandatory that each PO should be mapped to the respective PSO specified in the programme in order.
By the completion of the M.Sc Physics programme, the learners will be able to

PSO1: apply graduate-level acquaintance in solving problems and proving the theories in various areas of physics like quantum mechanics, solid state physics, molecular spectroscopy, mathematical physics and nanophysics.

PSO2: possess scientific attitude, experimental skills, analyze data and interpret the results obtained in physics related problems.

PSO3: implement the physical concepts in a high quality research or creative capstone project under appropriate disciplinary or multi disciplinary context.

PSO4: present the recent trends in physics effectively in seminars, conferences using ICT tools.

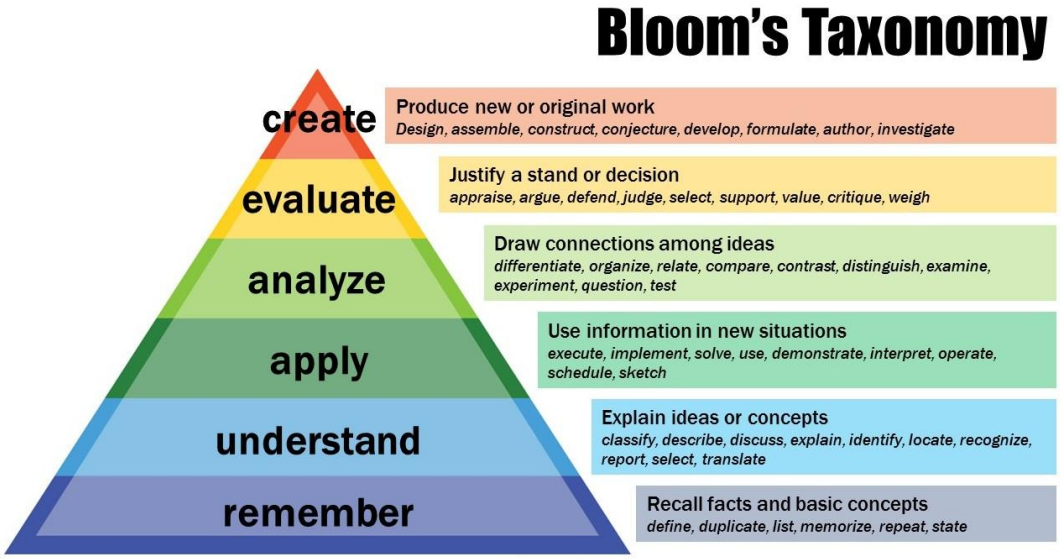
PSO5: plan and carry out group discussions, respond to the views of team members and perform complicated projects successfully.

PSO6: follow scientific ethics in all stages of scientific practices such as data collection, transcription, validation of results through replication and publication.

PSO7: realize the impact of science on society and engage in lifelong learning and professional development through self study or higher studies in the diverse fields like material science, electronics, energy devices, eco friendly materials etc.

BLOOM'S TAXONOMY:

Bloom's Taxonomy was created in 1956 by an educational psychologist Dr. Benjamin Bloom in order to promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts. It is most often used when designing educational, training, and learning processes.



The K-levels mentioned in the diagram are usually denoted as [k1] to [k6] respectively from the bottom.

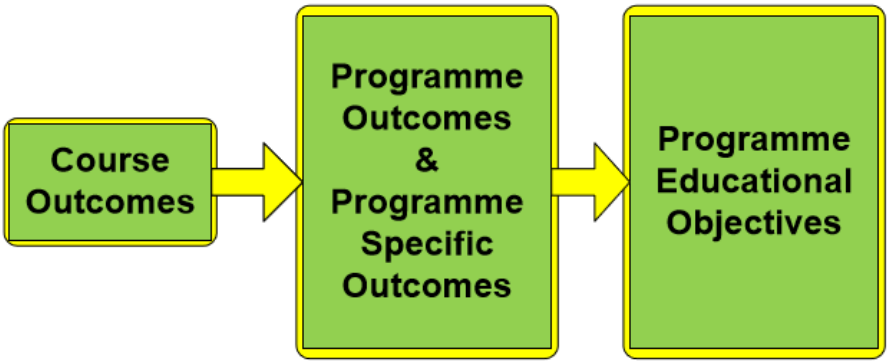
Course Outcomes (CO):

Course Outcomes are narrower statements that describe what students are expected to know and be able to do at the end of each course. These relate to the skills, knowledge, and behaviour that students acquire in their study through the course. Each course comprises five COs and the keywords used to define COs are based on Bloom's Taxonomy [k1] to [k6].

On successful completion of the course, the learners should be able to

CO1: [k1] / [k2]
CO2: [k3]
CO3: [k4]
CO4: [k5]
CO5: [k6]

D. CO-PO &PO-PEO relationship:



E. CO – PO MAPPING OF COURSES:

After CO statements are developed by the course in-charge, COs will be mapped with any possible POs based on the relationship exist between them. A CO must be mapped to atleast one PO. The PO's which are not related to any of the COs in a particular course may be left blank. All the courses together must cover all the POs. The CO-PO matrix for a course is as shown below.

The correlation between COs and PO can be defined by three levels using the Letter Grades H, M, L which denotes respectively High (H), Medium (M), Low (L) and '-' for no correlation.

The concept of Six Sigma is used for calculating weighted percentage of contribution of each course in attainment of respective POs. As per Six Sigma Tool- Cause and Effect Matrix, the weightage of H, M and L are 9, 3 and 1 respectively.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							
Weightage of the course							
Weighted percentage of Course contribution to POs							

The levels of contribution are denoted by Grades and weightages H-High (9), M-Medium (3), L-Low (1)
Weighted percentage of Contribution of the Course in attainment of PO1= Weightage of the course / Total weightage of all courses contributing PO1 computed based on correlation between COs and POs X 100

Programme Articulation Matrix (PAM):

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Total Weightage of all courses contributing to POs								

PO-PEO Mapping Matrix:

PEOs / POs	PEO1	PEO2	PEO3
PO1	X	X	X
PO2	X	X	
PO3	X	X	
PO4	X	X	X
PO5		X	X

PO6	**X**	**X**	**X**
PO7		**X**	

(Mark X to map a PO to a PEO)

II. ASSESSMENT PROCESS FOR CO ATTAINMENT

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a course.

Assessment tools for CO

Assessment tool	Marks	Description	Conduct of Direct Assessment Tool
Theory Courses- Internal Assessment (40 Marks) (for all courses except Part IV)			
Term Test	25 marks	Three written tests are conducted and average of best two is considered	Term Test I - after the completion of 30 working days Term Test II - after the completion of 55 working days Term test III - after the completion of 80 working days
Assignment	5 marks	Two Assignments for each course and the average of two is considered	Assignment I- before the commencement of Term Test I Assignment II- before the commencement of Term Test II
Seminar	10 marks	For PG, One Seminar for each course	For PG, Seminar should be completed before the commencement of Term Test III
Theory Courses- External Assessment (60 Marks)			
End Semester Examination	60 marks	Examination at the end of the course of 03- hour duration.	
Practical Courses - Internal Assessment (50 Marks)			
Observation / Record note book	10 marks	Submission of Observation / Record note book	
Skill Based Test	10 marks	Day to day evaluation / Skill Test	

Model Practical Examination	30 marks	A Minimum of **TWO** model Exams are conducted for each lab course and the average is considered.
Practical Courses - External Assessment (50 Marks)		
End Semester Practical Examination	50 marks	Examination at the end of the course of 03- hour duration

CO Assessment Rubrics

For the evaluation and assessment of CO's and PO's, rubrics are used.

Internal assessment contributes 60% and End Semester assessment contributes 40% to the total attainment of a CO for the theory courses. For the practical courses, internal assessment contributes 100% of total attainment to a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

CO Attainment:

Direct CO Attainment:

Course outcomes of all courses are assessed and the CO wise marks obtained by all the students are recorded for all the assessment tools mentioned above. The respective CO attainment level is evaluated based on set attainment rubrics.

Attainment Levels of COs

Assessment Methods	Attainment Levels	
Internal Assessment	Level 1	60% of students scoring more than average marks or set target marks in internal assessment tools
	Level 2	70% of students scoring more than average marks or set target marks in internal assessment tools
	Level 3	75% of students scoring more than average marks or set target marks in internal assessment tools
End Semester Examination	Level 1	60% of students scoring more than average marks or set target marks in End Semester Examination
	Level 2	70% of students scoring more than average marks or set target marks in End Semester Examination
	Level 3	75% of students scoring more than average marks or set target marks in End Semester Examination

Target setting for Assessment method:

For setting up the target of internal assessment tools, 50% of the maximum mark is allotted as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

Formula for Attainment for each CO:

Attainment = Percentage of students who have scored more than the target marks

$$\%\ \text{of Attainment} = \frac{\text{Number of students who scored more than the target}}{\text{Total number of students}} * 100$$

- Internal Attainment is the average of attainments obtained using various internal assessment tools.
- For Theory Courses,
  Direct CO Attainment = 60% of internal attainment + 40% of End Semester attainment.
- For Practical Courses,
  Direct CO Attainment = 100% of internal attainment.
- For Project,
  Direct CO Attainment = 100% of End semester attainment.

Indirect CO Attainment:

At the end of each course, an exit survey is collected from the students and it gives the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students about the attainment of course outcomes.

Overall CO Attainment = 80% of Direct CO Attainment + 20% of Indirect CO Attainment

In each course, the level of attainment of each CO is compared with the predefined targets, if the target is not reached, the course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the course teacher can set the target as a value greater than the CO attainment of the previous year.

III. ASSESSMENT PROCESS FOR PO ATTAINMENT

Measurement of PO attainment shall be done by direct and indirect methods. Direct assessment method and indirect assessment method are considered for 80% and 20% weightages respectively. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

Direct assessments (rubric based) - Conventional assessment tools such as Term Test, Quiz, Seminar, Assignment and End Semester Examination are used.

Indirect assessments – Done through Course Exit Survey.

The description of Assessment tools used for the evaluation of COs and POs is given below.

Mode of Assessment	Assessment Tool	Description	Evaluation of Course Outcomes	Related POs
Direct (Weightage 80%)	**Theory Courses- Internal Assessment (Weightage 60%)**			
	Theory-Term Test (25 marks)	Three written tests are conducted and average of best two is considered	The questions in the three Term Tests, seminar and Assignment are framed in such a way that they cover all the COs of respective course. The final attainment for each CO under direct assessment is calculated by taking average of the CO attainments from Term	PO1 to PO7
	Assignment (5 marks)	Two Assignments for each course and the average of		

		two is considered	Tests, Assignment and Seminar.	
	Seminar (10 marks)	One Seminar for each course		
	Theory Courses- External Assessment (Weightage 40%)			
	End Semester Examination (60 marks)	Examination at the end of the course of 03- hour duration	It covers the entire syllabus of the course. It would generally satisfy all course outcomes for a particular course. The COs are evaluated based on the set attainment levels.	PO1 to PO7
	Practical Courses - Internal Assessment (Weightage 100%)			
	Observation / Record note book (10 marks)	Submission of Observation / Record note book	Lab exercises are planned to cover all COs and CO attainment is calculated.	PO1 to PO7
	Skill Based Test (10 marks)	Day to day evaluation / Skill Test		
	Model Practical Examination (30 marks)	A Minimum of **TWO** model Exams are conducted for each lab course and the average is considered.		
Indirect (Weightage 20%)	Course Exit Survey	This survey gives the opinion of the students on attainment of Course Outcomes	At the end of each course, an exit survey is collected from the students and Considered for the CO attainment under Indirect assessment	PO1 to PO7

IV. ASSESSMENT PROCESS FOR OVERALL PO ATTAINMENT

With the help of CO against PO mapping, the PO attainment is calculated. PO assessment is done by giving 70% weightage to direct assessment and 30% weightage to indirect assessment. Direct assessment is based on CO attainment, where 40% weightage is given to attainment through End Semester examination and 60% weightage is given to attainment through internal assessments. Indirect assessment is done through Graduate exit survey and participation of students in Co-curricular / Extracurricular activities.

PO Assessment Tools

Mode of Assessment	Assessment Tool	Description
Direct Attainment (Weightage 70%)	CO Assessment	This is computed from the calculated CO Attainment value for each Course
Indirect Attainment (Weightage 30%)	Graduate Exit survey 10%	At the end of the programme, Graduate Exit Survey is collected from the graduates and it gives the opinion of the graduates on attainment of Programme Outcomes
	Co-curricular / Extracurricular activities 20%	For participation in Co-curricular / extracurricular activities during the period of their study.

Direct Attainment of POs for all Courses

At the end of the each programme, the direct PO assessment is done from the CO attainment of all courses. The direct PO attainment for a particular course is determined from the attainment values obtained for each course outcome related to that PO and the CO-PO mapping values. For the evaluation and assessment of CO's and PO's, the same set of rubrics is used.

Programme Articulation Matrix (PAM):

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Average Direct PO Attainment								
Direct PO Attainment in %								

Indirect Attainment of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Graduate Exit survey							
Indirect PO Attainment							

Indirect PO Attainment = 10% of PO Attainment from Graduate Exit survey + 20% of PO Attainment from the participation of students in Co-curricular / Extracurricular activities. Attainments of POs for all Courses

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Direct Attainment (Weightage 70%)							
Indirect Attainment (Weightage 30%)							
Overall PO Attainment							

Overall PO Attainment = 70% of Direct PO Attainment + 30% of Indirect PO Attainment

Expected Level of Attainment for each of the Programme Outcomes

PO	Level of Attainment
Value >=70%	Excellent
Value > = 60 and value < 70	Very good
Value > = 50 and value < 60	Good
Value > = 40 and value < 50	Satisfactory
Value < 40	Not Satisfactory

Level of PO attainment

Graduation Batch	Overall PO Attainment	Whether Expected level of PO is achieved?

V. ASSESSMENT PROCESS FOR PEOs

The curriculum is designed so that all courses contribute to the achievement of PEOs. The attainment of PEOs is measured only through Indirect methods.

Type of Assessment	Assessment Tool	Assessment criteria	Data collection frequency	Responsible entity	Indicators for Attainment of PEO
Indirect Weightage 100%	Placement Record Weightage 20%	Number of students Placed	Once in a year	Placement cell and Department	PEO-1 PEO-2 PEO-3
	Higher Education Weightage 20%	Number of students opted for higher education	Once in a year	Department	PEO-1 PEO-2 PEO-3
	Record of Entrepreneurship 10%	Number of Entrepreneurs	Once in a year	YWED cell and Incubation Centre	PEO-1 PEO-2 PEO-3
	Alumnae Survey Weightage 30%	Alumnae Survey is collected from the alumnae and it gives the	Once in a year	Alumnae Association	PEO-1 PEO-2 PEO-3

		opinion of the alumnae on attainment of Programme Outcomes and their achievements.			
	Feedback from Parents 10%	Feedback from parents is collected and it gives the opinion of the parent on attainment of Programme Outcomes of their ward.	Once in a year	Parents Teachers Association	PEO-1 PEO-2 PEO-3
	Feedback from Employer 10%	Feedback from the employer is collected and it gives the opinion of the employers on attainment of Programme Outcomes of their employee.	Once in a year	Placement Cell and Department	PEO-1 PEO-2 PEO-3

Target for PEO attainment

Assessment criteria	Target
Record of Placement	30 % of the class strength
Progression to Higher Education	25 % of the class strength
Record of Entrepreneurship	5 % of the class strength

Attainment of PEOs

Assessment Tool	Attainment of PEO
Record of Placement	
Progression to Higher Education	
Record of Entrepreneurship	
Alumnae Survey Weightage	
Feedback from Parents	

Feedback from Employer	
Total Attainment	

Percentage of PEO Attainment from placement $= \frac{\text{Number of students who have got placement}}{\text{Target}} \times 100$

Percentage of PEO Attainment from higher studies $= \frac{\text{Number of students who pursue higher studies}}{\text{Target}} \times 100$

Percentage of PEO Attainment from entrepreneurship $= \frac{\text{Number of students who have become entrepreneur}}{\text{Target}} \times 100$

PEO Attainment = 10% Attainment from placement + 20 % Attainment from higher studies + 10% Record of Entrepreneurs + 30% attainment of Alumnae survey + 10% Attainment from Parents Feedback + 20% Attainment from Employers Feedback

Expected Level of Attainment for each of the Programme Educational Objectives

PEO	Level of Attainment
Value >=70%	Excellent
Value > = 60 and value < 70	Very good
Value > = 50 and value < 60	Good
Value > = 40 and value < 50	Satisfactory
Value < 40	Not Satisfactory

Level of PEO attainment

Graduation Batch	Overall PEO Attainment	Whether Expected level of PEO is achieved?

Process of Redefining the PEOs:

The college has always been involving the key stake holders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected the objectives of the programme are defined, refined and are inscribed in the form of PEO's. The level of attainment of PEO's defined earlier will be analyzed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like BOS, Academic Council and Governing Body involve appropriate actions.

VI. Eligibility Condition for Admission:

For admission to M.Sc Physics, a candidate must have passed a 3 years degree course in Physics (B.Sc Physics) (under the 10+2+3 pattern) recognized by the university as equivalent there to.

For admission to PG programme, the qualifying examination marks in **Part – III** (Major, Allied/Ancillary) alone will be taken into consideration.

VII. Duration of the Programme:

The duration of the programme is three academic years. Each academic year consists of two semesters. The duration of a semester is 90 working days.

VIII. Attendance:

The Rules regarding the attendance for regular classes for the candidates to appear for the End Semester Examinations are framed as given below:

a) Each student must put in a minimum attendance of 68 days (75% of 90 days per semester) so as to become eligible to appear for the End Semester examinations.

Shortage of Attendance:

b) Those students with an attendance of 67 days and less but 59 days (65%) and above can be permitted to appear for the End Semester Examinations provided, they get the condonation certificate from the Principal stating the proper reasons for the absence, within 5 days after the last working day of the concerned class. The certificate may be obtained from the office on payment of penalty as per Madurai Kamaraj University Norms.

c) In case of attendance with 58 days and less but 45 days (50%) and above, the students cannot appear for the End Semester Examinations of that semester but can appear for the next End Semester Examinations by obtaining special permission from the Principal providing necessary documents supporting the reasons for absence on payment of penalty as per Madurai Kamaraj University Norms.

d) Students with an attendance of 44 days and less should repeat the whole semester.

IX. Evaluation Procedure:

Evaluation of each theory course will be 40 % for CIA and 60 % for End Semester Examinations. Evaluation of each Practical Course will be 50% for CIA and 50% for End Semester Examinations. Project will be evaluated for 100% in the End Semester Examinations. A mark statement will be issued to every student at the end of every semester.

X. Passing Minimum:

For a pass in each course a student should secure a 45% of marks in End Semester Examination (27 marks) and minimum of 50% in aggregate (50 marks) (i.e. marks of CIA and End Semester Examinations put together). The same rule is applicable for Dissertation / Project Report and Viva-Voce.

Minimum credits to be earned for M.Sc Programme is 90 credits.

For NPTEL and SWAYAM courses TWO credits will be given as extra credits.

XI. Eligibility Condition for getting the Degree:

A Candidate undergoing the M.Sc degree Programme in Physics will be eligible for the award of degree in Physics, if she completes the entire Programme and pass all the examinations prescribed for the Programme.

As per UGC guidelines, a student who is not able to complete the Programme within two years, may be allowed for 2 years period beyond the two years duration to clear the backlog to be qualified for the degree.

XII. Classification of Successful Candidates:

The successful candidates will be classified as per the details given in the table below:

CGPA	Grade	Classification of Final Result
9.50000 – 10.00000	O+	First Class
9.00000 – 9.49999	O	
8.50000 – 8.99999	D++	
8.00000 – 8.49999	D+	
7.50000 – 7.99999	D	
7.00000 – 7.49999	A++	
6.50000 – 6.99999	A+	
6.00000 – 6.49999	A	
5.50000 – 5.99999	B+	Second Class
5.00000 – 5.49999	B	
4.50000 – 4.99999	C+	Third Class
4.00000 – 4.49999	C	
0.00000 – 3.99999	U	Re-appear

XIII. Award of Ranks:

Candidates who qualify themselves for the respective degree programme passing all the examinations in the first attempt and secured first class are eligible for ranking I and II from the CGPA gained in the Core and Elective Courses.

$$\textbf{CUMULATIVE GRADE POINT AVERAGE [CGPA]} = \frac{\sum_i C_i G_i}{\sum_i C_i}$$

$$\textbf{CGPA} = \frac{\text{Sum of the multiplication of grade points by the respective credits of the course cleared in the entire programme}}{\text{Sum of the credits of all the courses cleared in the programme}}$$

Ci = Credits earned for course *i* in any semester

Gi = Grade point obtained for course *i* in any semester

$\sum_i$ = Summation of all courses cleared in a semester in the case of GPA and all courses cleared in all semesters in the case of CGPA.

XIV. Other Provisions:

1. In the Mark Sheet, the demarcation 'AA' will be marked against the courses for which the candidate was absent for the examination.
2. If a candidate is found indulging in malpractice, she must be expelled from the examination hall right away and debarred from appearing in all examinations of that particular semester. She can be allowed to take up examination only in the consecutive semester.
3. The courses she has already appeared during that semester will not be considered.
4. A student can appear for any number of arrear courses.
5. Repeat Examinations will be conducted for the final semester papers within a month after the publication of final semester results.
6. Revaluation is permitted.

XV. Transitory Provisions:

Students from other institutions have to appear and pass all the courses of all semesters under CBCS pattern in order to get the consolidated statement of marks.

Those students who have discontinued in the middle of the programme may be admitted in the respective semester if they want to rejoin and complete the programme; provided they had not got their transfer certificate.

The Standard Fireworks Rajaratnam College for Women, Sivakasi
M.Sc. Physics – Allotment of Hours and Credits
(For those who have joined in June 2020 and later)

Subjects	**I Semester**	**II Semester**	**III Semester**	**IV Semester**	**Total Credits**
Core courses:					
Core Paper I	6 **(5)**	6 **(5)**	6 **(5)**	6 **(5)**	
Core Paper II	6 **(4)**	6 **(4)**	6 **(4)**	6 **(5)**	
Core Paper III	6 **(4)**	6 **(4)**	6 **(4)**	6 **(4)**	
Lab	6 **(4)**	6 **(4)**	6 **(4)**	-	
Project and Viva Voce	-	-	-	6 **(5)**	
Total	24(**17**)	24(**17**)	24(**17**)	24 **(19)**	**70**
Electives	6 **(5)**	6(**5**)	6(**5**)	6 **(5)**	**20**
Total	30 **(22)**	30 **(22)**	30 **(22)**	30 **(24)**	**90**

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. Physics
(For those who have joined in 2020 and later)
OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM
PROGRAMME CODE – MDPH
PROGRAMME SCHEME

Semester	Course Code	Course Title	Teaching Hours Per Week	Credits	Duration of Exam (Hours)	Marks Allotted		
						Internal	External	Total
I	MDPH11	**Core Courses** Mathematical Physics – I	6	5	3	40	60	100
	MDPH12	Classical and Statistical Mechanics	6	4	3	40	60	100
	MDPH13	Linear Integrated Circuits	6	4	3	40	60	100
	MDPH1L	Advanced Physics Lab – I	6	4	5	50	50	100
	MDPH1E1/ MDPH1E2	**Elective Course I** Solar Energy and its applications / Digital Logic Design	6	5	3	40	60	100
		Total	**30**	**22**				**500**
Field visit mandatory for the course MDPH13 - Linear Integrated Circuits								
II	MDPH21	**Core Courses** Mathematical Physics – II	6	5	3	40	60	100
	MDPH22	Quantum Mechanics – I	6	4	3	40	60	100
	MDPH23	Electromagnetic Theory	6	4	3	40	60	100
	MDPH2L	Advanced Physics Lab – II	6	4	5	50	50	100
	MD2E	**Elective Course II (Offered by other Departments)**	6	5	3	40	60	100
		Total	**30**	**22**				**500**
III	MDPH31	**Core Courses** Solid State Physics –I	6	5	3	40	60	100
	MDPH32	Quantum Mechanics – II	6	4	3	40	60	100
	MDPH33	Computational Physics and Microprocessor	6	4	3	40	60	100
	MDPH3L	Advanced Physics Lab – III	6	4	5	50	50	100
	MDPH3E1/ MDPH3E2	**Elective Course III** Materials Science and IPR/ Recent Trends in Physics	6	5	3	40	60	100
		Total	**30**	**22**				**500**
Field visit mandatory for the course MDPH3E1- Materials Science and IPR								
IV	MDPH41	**Core Courses** Solid State Physics –II	6	5	3	40	60	100
	MDPH42	Nuclear and Particle Physics	6	5	3	40	60	100
	MDPH43	Molecular Spectroscopy	6	4	3	40	60	100
	MDPH4E1/	**Elective Course IV** Nano Physics /	6	5	3	40	60	100

	MDPH4E2	Medical Physics						
	MDPH4P	Project and viva voce	6	5	-	-	100	100
Total			**30**	**24**				**500**

ELECTIVE COURSE OFFERED FOR OTHER MAJOR STUDENTS

Semester	Course Code	Course Title	Teaching Hours Per Week	Credits	Duration of Exam (Hours)	Marks Allotted		
						Internal	External	Total
II	MDPH2E1 / MDPH2E2	Applied Physics/ Microcontroller	6	5	3	40	60	100

M.Sc Physics

Programme Articulation Matrix (PAM) - Weights

Course Code	Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
MDPH11	Mathematical Physics-I	33	25	11	13	0	0	5
MDPH12	Classical and Statistical Mechanics	30	15	15	5	0	0	1
MDPH13	Linear Integrated Circuits	31	27	33	3	0	0	5
MDPH1L	Advanced Physics Lab – I	33	30	21	15	0	3	5
MDPH1E	Elective I	37	31	13	15	0	0	0
MDPH21	Mathematical Physics-II	31	25	13	11	0	0	5
MDPH22	Quantum Mechanics-I	37	31	30	9	0	0	5
MDPH23	Electromagnetic Theory	39	33	15	15	0	0	0
MDPH2L	Advanced Physics Lab – II	33	30	21	15	0	3	5
MD2E	Elective II	19	7	7	6	0	0	0
MDPH31	Solid State Physics – I	39	33	33	5	0	0	5
MDPH32	Quantum Mechanics – II	37	31	30	9	0	0	5
MDPH33	Computational Physics and Microprocessor	39	33	33	15	0	0	4
MDPH3L	Advanced Physics Lab - III	39	33	39	15	0	5	5
MDPH3E	Elective III	37	33	33	0	5	0	5
MDPH41	Solid State Physics –II	39	33	33	9	0	0	5
MDPH42	Nuclear and Particle Physics	33	13	13	5	0	0	1
MDPH43	Molecular Spectroscopy	39	39	33	15	0	0	4
MDPH4P	Project and Viva Voce	39	33	33	27	15	9	5
MDPH4E	Elective IV	37	31	31	5	0	0	5
	Total	**701**	**566**	**490**	**212**	**20**	**20**	**75**

M.Sc Physics
Programme Articulation Matrix (PAM) – Weighted Percentage

Course Code	Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
MDPH11	Mathematical Physics-I	4.71	4.42	2.24	6.13	0	0	6.67
MDPH12	Classical and Statistical Mechanics	4.28	2.65	3.06	2.36	0	0	1.33
MDPH13	Linear Integrated Circuits	4.42	4.77	6.73	1.42	0	0	6.67
MDPH1L	Advanced Physics Lab – I	4.71	5.3	4.29	7.08	0	15	6.67
MDPH1E	Elective I	5.28	5.48	2.65	7.08	0	0	0
MDPH21	Mathematical Physics-II	4.42	4.42	2.65	5.19	0	0	6.67
MDPH22	Quantum Mechanics - I	5.28	5.48	6.12	4.25	0	0	6.67
MDPH23	Electromagnetic Theory	5.56	5.83	3.06	7.08	0	0	0
MDPH2L	Advanced Physics Lab – II	4.71	5.3	4.29	7.08	0	15	6.67
MD2E	Elective II	2.71	1.24	1.43	2.83	0	0	0
MDPH31	Solid State Physics – I	5.56	5.83	6.73	2.36	0	0	6.67
MDPH32	Quantum Mechanics - II	5.28	5.48	6.12	4.25	0	0	6.67
MDPH33	Computational Physics and Microprocessor	5.56	5.83	6.73	7.08	0	0	5.33
MDPH3L	Advanced Physics Lab – III	5.56	5.83	7.96	7.08	0	25	6.67
MDPH3E	Elective III	5.28	5.83	6.73	0	25	0	6.67
MDPH41	Solid State Physics –II	5.56	5.83	6.73	4.25	0	0	6.67
MDPH42	Nuclear and Particle Physics	4.71	2.3	2.65	2.36	0	0	1.33
MDPH43	Molecular Spectroscopy	5.56	6.89	6.73	7.08	0	0	5.33
MDPH4P	Project and Viva Voce	5.56	5.83	6.73	12.74	75	45	6.67
MDPH4E	Elective IV	5.28	5.48	6.33	2.36	0	0	6.67
	Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M. Sc. PHYSICS
SEMESTER I
CORE COURSE
MDPH11-MATHEMATICAL PHYSICS-I
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester : 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain about integral transforms, differential equations and special functions
CO2 [K3]: solve differential equations, integral transforms and special functions
CO3 [K3]: apply the generating function to obtain the recurrence relations for special functions
CO4 [K4]: analyze the orthogonal property and recurrence relations of special functions
CO5 [K5]: evaluate integral transforms, differential equations, beta function, gamma function and special functions

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	1	0	0	1
CO2	3	3	1	3	0	0	1
CO3	9	3	3	3	0	0	1
CO4	9	9	3	3	0	0	1
CO5	9	9	3	3	0	0	1
Weightage of the course	**33**	**25**	**11**	**13**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**4.71**	**4.42**	**2.24**	**6.13**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I (15L+3T)

Integral transforms:

Introduction – Fourier's Transform – Properties of Fourier's Transform - Fourier Transform of a Derivative – Fourier sine and cosine Transforms of Derivative's - Fourier Transform of Functions of two or three variables – Finite Fourier Transform – Simple Applications of Fourier Transforms- Laplace Transform – Properties of Laplace Transform - Laplace Transform of the Derivative of a function - Laplace Transform of Intergral - Laplace Transform of Periodic Function - Laplace Transform of Some Special Function.

Unit – II **(15L+3T)**

Differential Equations:

Introduction – Order and Degree of a Differential Equation – Solution of First Order Differential Equation by the Method of Separation of Variables – Linear Differential Equation of First Order and its Solution – Solution of Second Order Differential Equations with Constant Coefficients.

Unit – III **(15L+3T)**

Special Functions:

Definitions – Symmetry property of beta function – Evaluation of Beta Function – Transformation of Beta Function – Evaluation of Gamma Function – Transformation of Gamma Function – Relation between beta and gamma functions - Hermite functions, Laguerre functions (Generating Function, recurrence relations, Orthogonality relation, Rodrigue's Formula).

Unit – IV **(15L+3T)**

Bessel Functions:

Bessel's differential equation: Bessel functions of first and second kind - Differential equation reducible to Bessel's equation – Recurrence formulae for $J_n(x)$ – Generating function for $J_n(x)$

Unit – V **(15L+3T)**

Legendre Function:

Legendre differential equations and Legendre functions- Generating function of Legendre polynomials- Rodrigue's formula for Legendre polynomials – orthogonal properties of Legendre polynomial - Recurrence formulae for Legendre polynomials

Text Book:

Satya Prakash - Mathematical Physics with Classical Mechanics, Sultan Chand & Sons, New Delhi, 6th Revised Edition 2012**.**

Reference Books:

1. Pipes & Harvill - Applied Mathematics for Engineers and Physicists Mc Graw-Hill International Book Company 3rd Edition,1971
2. Butkov - Mathematical Methods for Physicists-1st edition, Addison Wesley Publishing company,1973
3. George B. Arfken & Hans J. Weber - Mathematical Methods for Physicists - 6th Edition. Published by Elsevier 2005

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Solving problems of Fourier and Laplace transforms	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
Solving of first order and second order differential equations	II	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of special functions	III	Mind Maps/Video/ Presentation/ Interactive Quizzes
Determination of recurrence relations for special functions	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of orthogonal properties of special functions	V	Mind Maps/Video/ Presentation/ Interactive Quizzes/Discussions

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc PHYSICS
SEMESTER I
CORE COURSE
MDPH12 – CLASSICAL AND STATISTICAL MECHANICS
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05 + 01)
Total number of hours per semester (Lecture + Tutorial): 90 (75 + 15)
Total number of credits : 04

Course Outcomes (CO):

CO1[K2]: explain the basic concepts in classical and statistical mechanics
CO2[K2]: describe Lagrangian equation, Hamiltonian methods, canonical transformations, methods of ensembles and quantum statistics
CO3[K3]: solve simple problems in classical and statistical mechanics
CO4[K4]: classify different constraints, Lagrangian from Hamiltonian, different ensembles and classical statistics from quantum mechanical statistics
CO5[K5]: appraise Lagrangian and Hamiltonian equations, Canonical transformations, Partition functions, thermodynamic properties of different ensembles and different properties of quantum mechanical statistics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	0	3	3	1	0	0	0
CO2	3	3	3	1	0	0	0
CO3	9	3	3	1	0	0	1
CO4	9	3	3	1	0	0	0
CO5	9	3	3	1	0	0	0
Weightage of the course	**30**	**15**	**15**	**5**	**0**	**0**	**1**
Weighted percentage of Course contribution to POs	**4.28**	**2.65**	**3.06**	**2.36**	**0**	**0**	**1.33**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I:

Basic Concepts of Lagrangian equation: (15L+3T)

Constraints- D'Alembert's Principle and Lagrange's Equations- Velocity – Dependent Potentials and the Dissipation Function- Simple Applications of the Lagrangian Formulation- Hamilton's Principle- Derivation of Lagrange's Equations from Hamilton's Principle- Extension of Hamilton's Principle to systems with Constraints, Conservation theorem and Symmetry properties, Energy Function and the Conservation of Energy.

Unit II :

Hamiltonian Methods: (15L+3T)

Legendre Transformations and the Hamilton Equations of motion – Cyclic Coordinates and conservation theorems – Routh's Procedure – Derivation of Hamilton's equations from a variational Principle – The Principle of Least action.

Unit III :

Canonical Transformations: (15L+3T)

The equations of Canonical Transformations – Examples of Canonical Transformations - Poisson Brackets and other Canonical invariants - Equation of motion in the Poisson Bracket formulation. The Hamilton-Jacobi Equation for Hamilton's Principal Function – The Harmonic Oscillator Problem as an example of the Hamilton – Jacobi Method – The Hamilton – Jacobi equation for Hamilton's characteristic function – Separation of Variables in the Hamilton-Jacobi equation.

Unit IV:

Methods of ensembles: (15L+3T)

Phase space - More about phase space, Ensemble and Ensemble average – Ensembles - Uses of ensembles-Density of Distribution in phase space - Liouville's Theorem - Connection between Statistical and Thermodynamical Quantities – Gibbs paradox – Partition function and its correlation with thermodynamic quantities (microcanonical) – Gibbs canonical ensemble – Thermodynamic functions for canonical ensemble – Partition function and their properties – Grand canonical ensemble - Partition function and thermodynamic properties – Comparison of ensembles – Equipartition theorem from canonical distribution.

Unit V: (15L+3T)

Quantum Statistical Mechanics:

Transition from classical statistical mechanics to quantum statistical mechanics – Indistinguishability and quantum statistics - Exchange symmetry of wave functions – Energy and pressure of the Bose Einstein gas – Gas degeneracy - Bose Einstein Condensation – Thermal properties of Bose Einstein gas – Landau's theory - Energy and pressure of the Fermi dirac gas – Electron Gas - Free electron model and electronic emission - Fluctuation in energy – Pressure – Volume – Enthalpy – Probability of one dimensional Random walk – Brownian movement.

Text Books :

Units – I, II and III

1. H. Goldstein, Charles P. Poole, John Safko - Classical Mechanics, Eighth Impression, 2013 – Pearson Education, Inc., Addison-Wesley.

Units – IV and V

2. Gupta & Kumar - Statistical Mechanics, Pragati Prakashan, Meerut, Twenty First Edition, 2006.

Reference Books:

1. G. Aruldhas - Classical Mechanics, Sixth Printing, 2015, PHI Learning Pvt. Ltd. Delhi.
2. S. L. Gupta, V. Kumar, Sharma - Classical Mechanics, Twenty- Fourth Edition, 2010, Pragati – H.V. Prakashan Publications.
3. Agarwal and Eisner - Statistical Mechanics, Third Reprint 1994, Wiley Eastern Limited, New Age International Limited.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Constraints, Simple Applications of the Lagrangian Formulation	I	Mind Maps/Video/ Presentation
Cyclic Coordinates and conservation theorems, The Principle of Least action	II	Mind Maps/Video/ Presentation/Problem solving
Canonical Transformations, Poisson Brackets, Hamilton's Principle	III	Presentation/Video/Problem solving
Phase space, Ensemble, Equipartition theorem, Comparison of ensembles	IV	Mind Maps/Video/ Presentation
Gas degeneracy, Bose Einstein Condensation, Free electron model and electronic emission, Brownian movement	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER I
CORE COURSE
MDPH13 – LINEAR INTEGRATED CIRCUITS
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial): 90(75+15)
Total number of credits : 04

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: describe the working of op-amp, comparator and 555 timer with necessary diagrams
CO2[K2]: explain the characteristics of op-amp and operation of 555 timer
CO3[K3]: use op-amp for different applications and construct active and passive components
CO4[K4]: analyze waveform generators, detectors, oscillators, op-amp, filters, multivibrators and fabrication technology of ICs.
CO5[K5]: assess the steps in fabrication of semiconductors, op-amp, comparator and timer

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	0	0	1
CO2	3	3	3	0	0	0	1
CO3	9	3	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**31**	**27**	**33**	**3**	**0**	**0**	**5**
Weighted percentage of Course contribution to Pos	**4.42**	**4.77**	**6.73**	**1.42**	**0**	**0**	**6.67**

Based on the level of contribution(9-High, 3-Medium, 1-Low)

Unit I:

Operational Amplifier: (15L+3T)

Introduction - Basic information of Op-Amp-The ideal operational amplifier-Open loop operation of Op-Amp- Open Loop Operation of Op-Amp-Feedback in ideal Op-Amp-The Inverting Amplifier-The Non Inverting Amplifier-Voltage follower - Differential Amplifier-Common Mode Rejection Ratio-Operational amplifier internal circuit - Circuit for Improving CMRR-Input Resistance- -Motorola MC1530 Op-Amp-741 Op-Amp.

Unit II:

Operational amplifier applications: (15L+3T)

Introduction-Basic Op-Amp Applications -Instrumentation Amplifier-AC Amplifier-V to I and I to V Converter-Op Amp Circuits using diodes- Sample and Hold Circuit-Log and Antilog Amplifiers-Differentiator - Integrator-Electronic Analog computation-Monolithic power amplifiers.

Unit III: (15L+3T)

Comparators and Waveform Generators:

Introduction-Comparator-Applications of Comparator – Zero crossing detector – window detector – Time marker generator – Phase detector - Regenerative Comparator (Schmitt Trigger)-Square wave generator (Astable multivibrator) – Monostable multivibrator – Triangular wave generator- Sine wave Generators–Phase shift oscillator- wien bridge oscillator.

Unit IV: (15L+3T)

Active Filters:

RC Active Filters-First Order Low Pass Filter - Higher Order Low Pass Filter-High Pass Active Filter-Band Pass Filter-Band Reject Filter

555 Timer:

Introduction-Description of Fundamental diagram-Monostable Operation-Applications in Monostable Mode – Missing pulse detector – Linear ramp generator – Frequency divider- Pulse width modulation – Astable operation-Applications in Astable Mode – FSK generator – Pulse Position modulator - Schmitt Trigger.

Unit V: (15L+3T)

Integrated circuit fabrication:

Introduction-Classification-Fundamentals of Monolithic IC Technology-Basic Planar Processes-Silicon Wafer Preparation-Epitaxial Growth-Oxidation-Photolithography-Diffusion-Ion Implantation -Isolation Techniques-Metallization-Assembly Processing and Packaging-Fabrication of a Typical Circuit-Active and Passive Components for IC's-Monolithic Transistors-Monolithic Diodes-Integrated Resistors-Integrated Capacitor-Integrated Inductors.

Text Book:

D.Roy Choudhury Shail B.Jain - Linear Integrated Circuits-
New Age International (P) Limited,
Publishers
Reprint 2005.

Reference Books:

1. Jacob Millman and Christos C.Halkias – Integrated Electronics, (Analog and digital circuits and systems) Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1991, 29th reprint 2003.
2. Ramakant A. Gayakward - Op-Amps & Linear integrated Circuits, Prentice Hall PTR, 2000, 4th Edition.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
The Non Inverting Amplifier	I	Writing /Presentation
Basic Op-Amp Applications	II	Assignment/ Presentation
Band Pass Filter	III	Video Presentation / Problem
Applications in Astable Mode	IV	Mind map/ Presentation
Basic Planar Processes	V	Mind map/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER I
MDPH1L – ADVANCED PHYSICS LAB – I
(Any 12 experiments)
(For those admitted in June 2020 and later)

Contact hours per week : 06
Total number of hours per semester : 90
Total number of Credits : 04

Course Outcomes (CO):

On successful completion of the course, the learners should be able to
CO1[K2]: describe the principles of the experiments.
CO2[K3]: construct electronic and non-electronic set ups.
CO2[K3]: determine the physical parameters by following the laboratory ethics
CO4[K4]: analyze the data both manually and graphically.
CO5[K5]: interpret the obtained results.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	3	0	0	1
CO2	3	3	3	3	0	0	1
CO3	9	9	9	3	0	3	1
CO4	9	9	9	3	0	0	1
CO5	9	9	0	3	0	0	1
Weightage of the course	**33**	**30**	**21**	**15**	**0**	**3**	**5**
Weighted percentage of Course contribution to POs	**4.71**	**5.3**	**4.29**	**7.08**	**0**	**15**	**6.67**

List of Experiments

1. Young's Modulus of a plate - Hyperbolic fringes.
2. Study of Susceptibility measurements of liquids – Quincke's method.
3. Ultrasonic Studies of Liquids.
4. Electrical Conductivity – Four Probe Conductivity (Energy Gap Calculation).
5. Hall Effect.
6. Dielectric Studies of Liquids.
7. Determination of numerical aperture and bending loss using Fiber Optics kit.
8. Mutual inductance between two coils for various distances by Carey Foster method.

9. Construction of Saw tooth Wave generator.
10. K-map simplification.
11. BCD to Seven segment display
12. Arithmetic Logic Unit
13. Inverting and Non- inverting amplifier using Op-amp
14. Clippers using OP-AMP
15. Study of active low pass filter using Op-amp.
16. Study of active high pass filter using Op-amp.
17. Parallel – in – Serial out register
18. Parallel – in – Parallel out register.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER I
CORE ELECTIVE COURSE
MDPH1E1 – SOLAR ENERGY AND ITS APPLICATIONS
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture + Tutorial) : 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain basics of solar radiation, collectors, energy storage, solar cells and applications
CO2 [K2]: describe the different types of solar energy resources and its applications
CO3 [K3]: apply the concepts of solar energy to fabricate solar cells
CO4 [K4]: analyze the working principle of instruments used in solar energy
CO5 [K5]: appraise the essentials of solar energy

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	3	0	0	0
CO2	9	3	3	3	0	0	0
CO3	9	9	3	3	0	0	0
CO4	9	9	3	3	0	0	0
CO5	9	9	3	3	0	0	0
Weightage of the course	**37**	**31**	**13**	**15**	**0**	**0**	**0**
Weighted percentage of Course contribution to Pos	**5.28**	**5.48**	**2.65**	**7.08**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I (15L+3T)

Fundamentals of Solar Radiation

The Physics of the sun and its energy transport – Thermal radiation fundamentals: Black body radiation, Intensity of radiation and shape factor, Transmission of radiation through a medium, Sun-Earth geometric relationship: Solar time and angles, Sun-path diagram, Shadow-angle protractor – Solar radiation: Extraterrestrial solar radiation – Measurement of Solar radiation: Instruments for measuring solar radiation and sunshine, Detectors for solar radiation instrumentation, Measurement of spectral solar radiation, Wide band spectral measurements.

Unit – II **(15L+3T)**

Solar Thermal Collectors

Radiative properties and Characteristics of materials: Selective surfaces, Reflecting surfaces, Transparent materials – Flat plate collectors: Liquid type collectors, Air-type collectors, Energy balance for a flat-plate collector, Collector efficiency factor – Tubular solar energy collectors: Evacuated-tube collectors, Thermal analysis of a tubular collector – Parabolic trough concentrator: Optical analysis of PTC, Thermal losses from PTC, Thermal performance of PTC collector.

Unit – III **(15L+3T)**

Thermal Energy Storage and Transport

Thermal energy storage – Types of thermal energy storage: Sensible heat storage, latent heat storage, thermochemical energy storage – Design of storage system: Selection of storage material, solar collection system, application, additional considerations – Design of containment – Heat-exchanger design: packed bed storage, pressure drop in a packed bed, flow across tube banks, performance of packed bed TES systems.

Unit – IV **(15L+3T)**

Photovoltaics

Semiconductors: p-n junction, PV effect – Analysis of PV cells: Efficiency of solar cells, maximum power point tracking, multijunction solar cells, thin-film solar cells, dye-sensitized solar cells and polymer solar cells – fabrication of DSSC – design of a PV system – Manufacture of solar cells and panels: Single-crystal and polycrystalline cells, amorphous silicon and thin-film fabrication – Design for remote PV applications: Estimation of loads and load profiles, estimation of available solar radiation, PV system sizing, water pumping applications.

Unit – V **(15L+3T)**

Solar Photochemical Applications

Photocatalytic reactions – Solar photocatalytic detoxification, Solar reactors: Concentrator reactors, nonconcentrating reactors, flat-plate reactors, tubular reactors, shallow solar ponds, falling film – Useful isolation – Catalyst development – System design methodology: Catalyst life – Gas-phase photocatalytic detoxification: photoreactors – Commercial/industrial applications – Solar disinfection of water and air.

Text Books:

1. D. Yogi Goswami – Principles of Solar Engineering, CRC Press. Third Edition

Study material will be provided for all five units

Reference Books

1. H. P. Garg, J. Prakash - Solar Energy: Fundamentals and Applications, Tata McGraw-Hill Publishing Company Limited,

New Delhi, First Revised Edition, 2000.
2. J. Richards - Solar Energy,
Macmillan Education Australia PTY LTD.
2010.

Tutorials:

Topic	**Unit**	**Constructive Alignment – Learning Activity**
Solar time and angles, Sun-path diagram, Shadow-angle protractor	**I**	Mind Maps/Video/ Presentation/ Interactive Quizzes
Flat plate collectors, Air-type collectors, Evacuated-tube collectors, Parabolic trough concentrator	**II**	Mind Maps/Video/ Presentation/ Interactive Quizzes
Types of thermal energy storage, Solar collection system, Heat-exchanger design,	**III**	Mind Maps/Video/ Presentation/ Interactive Quizzes
PV effect, thin-film solar cells, dye-sensitized solar cells and polymer solar cells, fabrication of DSSC	**IV**	Mind Maps/Video/ Presentation/ Interactive Quizzes
Solar reactors, flat-plate reactors, tubular reactors, shallow solar ponds	**V**	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER I
CORE ELECTIVE COURSE
MDPH1E2 - DIGITAL LOGIC DESIGN
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture hour + Tutorial): 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the theory regarding simplification of boolean functions and the working of digital circuits (combinational and sequential) with circuits diagram
CO2[K3]: apply the simplification and design procedure to solve problems
CO3[K4]: simplify the Boolean functions and analyze digital circuits (combinational and sequential) using gates and flip flops
CO4[K6]: construct circuits (combinational and sequential) for the simplified boolean functions
CO5[K6]: design combinational and sequential circuits using gates and flip flops

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	3	0	0	0
CO2	9	3	3	3	0	0	0
CO3	9	9	3	3	0	0	0
CO4	9	9	3	3	0	0	0
CO5	9	9	3	3	0	0	0
Weightage of the course	**37**	**31**	**13**	**15**	**0**	**0**	**0**
Weighted percentage of Course contribution to POs	**5.28**	**5.48**	**2.65**	**7.08**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I :
Simplification of Boolean Functions: (15L+3T)
The Map Method – Two-and Three-Variable Maps – Four-Variable Map – Five- and Six-Variable Maps – Product of Sums Simplification – NAND and NOR Implementation – Other Two-Level Implementations – Don't-Care Conditions.

Unit II :

Combinational Logic : (15L+3T)

Introduction – Design Procedure – Adders – Subtractors – Code Conversion – Analysis Procedure – Multilevel NAND Circuits – Multilevel NOR Circuits – Exclusive-OR and Equivalence Functions.

Unit III :

Combinational Logic with MSI and LSI: (15L+3T)

Introduction – Binary Parallel Adder – Carry propagation-Decimal Adder – BCD adder-Magnitude Comparator – Decoders –Demultiplexers-Encoders- Multiplexers – Read-Only Memory(ROM) – Programmable Logic Array(PLA).

Unit IV :

Sequential Logic: (15L+3T)

Introduction – Flip-Flops – Triggering of Flip-Flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Flip-Flop Excitation Tables – Design Procedure – Design of Counters – Design with State Equations

Unit V :

Registers, Counters and the Memory Unit: (15L+3T)

Introduction – Registers –Register with parallel load-Sequential logic implementation-Shift Registers – Serial transfer-Bidirectional Shift register with parallel load-Serial addition-Ripple Counters –Binary Ripple counter-BCD Ripple counter- Synchronous Counters – Binary counter-Binary Up-Down counter-BCD counter-Timing Sequences -Johnson Counter.

Text Book :

M. Morris Mano – Digital Logic and Computer Design
Publisher: Pearson
Edition: 1, 2016
New Delhi

Reference Book:

S Salivahanan & S Arivazhagan - Digital Circuits and Design
Vikas Publishing House Pvt Ltd.2nd Edition 2003
4th Reprint 2004

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Sum of product simplification	I	Problem/ designing circuits
Design Procedure	II	Problem/ designing circuits Video/ Presentation
Multiplexers	III	Problem/ designing circuits / Video/ Presentation
Design of Counters	IV	Video/ Presentation/ Problem/ designing circuits
Registers	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M. Sc. PHYSICS
SEMESTER II
CORE COURSE
MDPH21-MATHEMATICAL PHYSICS-II
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial): 90 (75+15)
Total number of number of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1 [K2]: explain the types of tensor, vectors, matrices, theorems, complex variables, Dirac Delta function, reducible and irreducible representations.
CO2 [K3]: solve problems in vectors, matrices, tensors, Dirac delta function, green functions and complex variables.
CO3 [K3]: construct the analytic functions using Cauchy-Riemann conditions and the character table for point group.
CO4 [K4]: analyze complex variables, tensors, Dirac delta function, green functions and character table for point group.
CO5 [K5]: evaluate tensors, vectors, matrices, complex variables

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	1	0	0	1
CO2	3	3	3	1	0	0	1
CO3	9	3	3	3	0	0	1
CO4	9	9	3	3	0	0	1
CO5	9	9	3	3	0	0	1
Weightage of the course	**31**	**25**	**13**	**11**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**4.42**	**4.42**	**2.65**	**5.19**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I **(15L+3T)**

Vector Analysis:

Line, surface and volume integrals – Gauss Divergence Theorem – Deductions from Gauss Divergence Theorem – Stoke's Theorem – Deductions from Stoke's theorem.

Matrix Algebra:

Solution of Linear equation – Linear Transformation – Orthogonal and Unitary Transformations – Similarity Transformation – Eigen Values, Eigen Vectors; Characteristic equation of a Matrix – Cayley-Hamilton Theorem – Diagonalization of Matrices.

Unit – II **(15L+3T)**

Tensors:

Introduction – n-dimensional space- coordinate transformations- Contravariant and covariant vectors – Tensors of higher ranks - Algebra of tensors – Symmetric and antisymmetric tensors – Invariant tensors- conjugate tensors – Line element: metric tensors - Fundamental tensor – raising and lowering of indices: associated tensors.

Unit – III **(15L+3T)**

Complex variables:

Complex numbers-Algebraic operation - complex conjugates-Modulus and argument of Complex number-Graphical representation on Argand diagram and Trigonometric form- Analytic function-Cauchy-Riemann Differential equation-Laplace's equation; Harmonic function-Cauchy's Integral theorem-Cauchy's integral formula-Derivatives of an analytic function-Morera's theorem-Liouville's theorem-Taylor's series-Laurent's series-singularities of an analytics function-Residues and their evaluation-Cauchy residue theorem-Evaluation of definite integral.

Unit – IV **(15L+3T)**

Dirac Delta and Greens Function:

Dirac Delta function-Properties of delta function- Fourier transform of delta function – Laplace transform of delta function -Derivative of delta function-Completeness condition in terms of Dirac Delta function-Three dimensional delta function – Green's Function: An Introduction – Green's Function for 1D case – General Proof of Symmetry Property of Green's Function – Eigen Function.

Unit – V **(15L+3T)**

Group Theory:

Introduction – Symmetry elements and Symmetry operations – Group postulates and types of group – Multiplication tables – Subgroup and Classes – Matrices – Matrix representations of Symmetry operations – Reducible and Irreducible representations – Orthogonality theorem – Properties of Irreducible representations – Construction of Character Tables for point group.

Text Books:

Units – I, II, III and IV

1. Satya Prakash - Mathematical Physics with Classical Mechanics, Sultan Chand & Sons, New Delhi, 6th Revised Edition 2012**.**

Units -V

2. K. V Raman - Group Theory and its Applications to Chemistry, Tata Mac Graw-Hill Publishing Company Limited, New Delhi, 1994

Reference Books:

1. Pipes & Harvill - Applied Mathematics for Engineers and Physicists Mc Graw-Hill International Book Company,3rd Edition,1971
2. Butkov - Mathematical Methods for Physicists-1st edition, Addison Wesley Publishing company,1973
3. George B. Arfken & Hans J. Weber - Mathematical Methods for Physicists - 6th Edition. Published by Elsevier 2005

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Vector Analysis and Matrix algebra	I	Mind Maps/Video/ Presentation/ Interactive Quizzes/Discussions
Tensors	II	Mind Maps/Video/ Presentation/ Interactive Quizzes
Complex variables	III	Mind Maps/Video/ Presentation/ Interactive Quizzes
Dirac Delta and Greens Function:	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes/Problem solving skill
Group Theory	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER-II
CORE COURSE
MDPH22- QUANTUM MECHANICS - I
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture hour + Tutorial) : 90 (75+15)
Total number of number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: describe the inadequacies of classical concepts, properties of Schrodinger wave function, energy & momentum eigen functions, angular momentum operators and various approximation methods.
CO2[K3]: apply Schrodinger wave equation to solve stationary state problems and exactly soluble eigen value problems.
CO3[K3]: apply various approximation methods to solve stationary state problems.
CO4[K4]: analyze the shortcomings of classical concepts, solution of various stationary state & exactly soluble eigen value problems and general formalism of wave mechanics.
CO5[K5]: evaluate eigen values, eigen functions and various approximation methods for stationary state problems.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	0	0	0	0	1
CO2	9	3	3	0	0	0	1
CO3	9	9	9	3	0	0	1
CO4	9	9	9	3	0	0	1
CO5	9	9	9	3	0	0	1
Weightage of the course	**37**	**31**	**30**	**9**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.28**	**5.48**	**6.12**	**4.25**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I : **(15L+3T)**

Towards Quantum Mechanics :

Inadequacy of classical concepts : Macroscopic Statistical Phenomena - Black body radiation; Planck's Quantum hypothesis – Specific heat of Solids – **Electromagnetic Radiation – Wave-Particle Duality:** The Photoelectric effect- Compton effect – **Atomic Structure and Atomic Spectra:** Rutherford atom model – Bohr's Postulates – Bohr's theory of Hydrogen spectrum – Bohr-Sommerfeld quantum rules; Degeneracy – **Matter Waves**: Debroglie Hypothesis – The Motion of a free wave packet; Classical Approximation and the Uncertainty Principle – Diffraction phenomena: Interpretation of wave particle Dualism – Complementarity.

Unit II : **(15L+3T)**

The Schrodinger equation and Stationary States:

The Schrodinger equation: A free particle in one dimension- Generalisation to three dimensions – The Operator correspondence and the Schrodinger equation for a particle subject to forces - **Physical interpretation and conditions on ψ:** Normalisation and Probability interpretation- Non-normalizable wave functions and Box normalization- Conservation of Probability - Expectation values; Ehrenfest's theorem - Admissibility conditions on the wave function- **Stationary states and energy spectra:** Stationary States; The time independent Schrodinger equation – A particle in a Square well potential- Bound states in a square well: ($E < 0$)- The square well: Non- localised States($E > 0$) - Square potential barrier.

Unit III : **(15L+3T)**

General formalism of wave mechanics

The Schrodinger equation and the probability interpretation for an N-particle system - The fundamental postulates of wave mechanics- The adjoint of an operator and self- adjointness - The eigenvalue problem; Degeneracy - Eigenvalues and Eigenfunctions of self- adjoint operators – The Dirac Delta function- Observables: Completeness and Normalisation of eigen functions – Closure - Physical interpretation of eigenvalues, eigenfunctions and expansion coefficients - Momentum eigenfunctions; Wave functions in momentum space - The uncertainty principle - States with minimum value for uncertainty product.

Unit IV : **(15L+3T)**

Exactly soluble eigenvalue problems

The Simple harmonic oscillator: The Schrodinger equation and energy eigenvalues - The energy eigenfunctions - Properties of stationary states - The abstract operator method - **Angular momentum and Parity:** The angular momentum operators - The eigenvalue equation for L^2; Separation of variables - Admissibility conditions on solutions; Eigenvalues - Physical interpretation – Parity - Angular momentum in stationary states of systems with spherical symmetry - **The Hydrogen atom:** Solution of the radial equation; energy levels - Solution in parabolic coordinates.

Unit V : **(15L+3T)**

Approximation methods for stationary states

Perturbation Theory for Discrete Levels: Equations in various orders of Perturbation theory — The Non - Degenerate case - The Degenerate case - Removal of degeneracy - The effect of an electric field on the energy level of an atom (Stark effect) - Two electron atoms – **The Variation Method:** Upper bound on ground state energy - Application to excited states - Trial function linear in variational parameters - The Hydrogen molecule - Exchange interaction – **The WKB Approximation:** The one dimensional Schrödinger equation.

Text Book :

P.M.Mathews & K.Venkatesan - A Text book of Quantum Mechanics - Tata McGraw

Hill Education Private Limited, New Delhi (2010) - II edition.

Reference Books:

1. Leonard I. Schiff - Quantum Mechanics
   McGraw Hill International Editions
   Third Edition, 1968
2. John L.Powell & Crasemann - Quantum Mechanics
   Narosa Publishing House, Ninth Reprint 1998
3. Sathya Prakash - Advanced Quantum Mechanics
   Kedar Nath Ram Nath Publishers, Meerut
   Fifth Revised and enlarged Edition 1999

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Inadequacy of classical concepts	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
A particle in a Square well potential	II	Video/ Presentation/ Interactive Quizzes
The adjoint and self- adjoint operators, Eigenvalues and Eigenfunctions	III	Presentation/ Interactive Quizzes
The angular momentum operators, Parity	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes
Variation Method, WKB Approximation	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER II
CORE COURSE
MDPH23 - ELECTROMAGNETIC THEORY
(For those admitted in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial): 90 (75+15)
Total number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the basic concepts and different laws of electrostatic fields, magnetic fields, propagation of waves and Maxwell's equations.
CO2[K2]: describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.
CO3[K3]: apply different techniques of vector calculus to solve problems related to electromagnetic field.
CO4[K4]: analyze static electric and magnetic fields, the propagation of electromagnetic waves in different media and their interfaces.
CO5[K5]: evaluate electric and magnetic parameters, electromagnetic wave propagation in different transmission lines and media.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	0	0	0
CO2	9	3	3	3	0	0	0
CO3	9	9	3	3	0	0	0
CO4	9	9	3	3	0	0	0
CO5	9	9	3	3	0	0	0
Weightage of the course	**39**	**33**	**15**	**15**	**0**	**0**	**0**
Weighted percentage of Course contribution to POs	**5.56**	**5.83**	**3.06**	**7.08**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I
Electrostatic Fields I : (15L+3T)

Coulomb's law – The Electric Field Intensity – The Electric potential - The Electric field inside and outside macroscopic bodies – Gauss's law – The equations of Poisson and Laplace – Conductors – Calculation of electric field produced by a simple charge distribution – The electric dipole – The linear electric quadrupole – Electric multipoles – The electric field outside an arbitrary

charge distribution – The average electric field intensity inside a sphere containing an arbitrary charge distribution - The potential energy of a charge distribution – Energy density in an electric field – Forces on conductors.

Electrostatic Fields II :

Electric polarization – Electric field at an exterior point

Electrostatic Fields III :

Continuity of V, D_n, E_t at the interface between two different media – The uniqueness theorem – Solution of Laplace's equation in rectangular coordinates – Solution of Poisson's equation for V- Solution of Poisson's equation for E.

Unit II

Magnetic Fields I: (15L+3T)

Magnetic forces – The magnetic induction B – The Biot – Savart law – The force on a point charge moving in a magnetic field – The divergence of the magnetic induction B – The vector potential A – The curl of the magnetic Induction B – Ampere's circuital law – The magnetic dipole.

Magnetic Fields II :

The Faraday induction law – The induced electric field intensity E in terms of the vector potential A – Induced electromotance in a moving system – Inductance and induced electromotance – Energy stored in a magnetic field.

Unit III

Maxwell's Equations : (15L+3T)

The conservation of electric charge – The potentials V and A – The Lorentz condition – The divergence of E and the non-homogenous wave equation for V - The non-homogenous wave equation for A - The curl of B-Maxwell's Equations – Duality – Lorentz's Lemma – The non-homogenous wave equations for E and B.

Unit IV (15L+3T)

Propagation of Electromagnetic waves I :

Plane electromagnetic waves in free space – The E and H vectors in homogenous, isotropic, linear and stationary media – Propagation of plane electromagnetic waves in non-conductors - Propagation of plane electromagnetic waves in conducting media - Propagation of plane electromagnetic waves in good conductors - Propagation of plane electromagnetic waves in low – pressure ionized gases.

Unit V (15L+3T)

Propagation of Electromagnetic waves II :

The laws of Reflection and Snell's Law of Refraction – Fresnel's Equations – Reflection and Refraction at the interface between two nonmagnetic nonconductors – Total reflection at an interface between two nonmagnetic nonconductors.

Propagation of Electro magnetic waves III :

Propagation in a straight line – TE and TM waves-TEM waves – Boundary conditions at the surface of metallic wave guides - The coaxial line – The hollow rectangular wave guide.

Text Book:

Paul Lorrain and Dale R. Corson - Electromagnetic Fields and Waves
CBS Publishers & Distributors (New Delhi)
II Edition, First Indian Edition 1986, Reprint 2003

Reference books :

1. John R. Reitz – Foundation of Electromagnetic theory
   Frederick J.Milford Addison-Wesley;
   Robert W.Christy IV Edition, 2008

2. David J. Griffiths – Introduction to Electrodynamics – Pearson Education – IV Edition, 2015

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Electric dipole/ Electric quadrupole/ Charge distributions	I	Mind Maps/Video/ Presentation/
Biot-Savart law/ Faraday's induction law	II	Video/ Presentation
Maxwell's Equations	III	Mind Maps/Video/ Presentation
Propagation of Electromagnetic waves	IV	Video/ Presentation/ Scrap book
TE, TM, TEM waves propagation	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER II
CORE COURSE
MDPH2L – ADVANCED PHYSICS LAB – II
(Any 12 experiments)

(For those admitted in June 2020 and later)

Contact hours per week : 06
Total number of hours per semester : 90
Total number of number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: describe the principles of the experiments.
CO2[K3]: construct electronic and non-electronic setups
CO3[K3]: calculate the physical parameters
CO4[K4]: analyze the data and draw conclusions manually and graphically
CO5[K5]: evaluate the experimental results with laboratory ethics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	3	0	0	1
CO2	3	3	3	3	0	0	1
CO3	9	9	9	3	0	3	1
CO4	9	9	9	3	0	0	1
CO5	9	9	0	3	0	0	1
Weightage of the course	**33**	**30**	**21**	**15**	**0**	**3**	**5**
Weighted percentage of Course contribution to POs	**4.71**	**5.3**	**4.29**	**7.08**	**0**	**15**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

List of Experiments:

1. Wavelength of Spectral lines using Hartmann's Interpolation Method (Arc spectrum)
2. Young's Modulus of a plate using Elliptic fringes.
3. Edser Butler fringes.
4. Wavelength of sodium light and separation between D_1 and D_2 lines of sodium light using Michelson's interferometer.
5. Ultrasonic Studies of Solids.
6. Dielectric Studies of Solids.
7. Thermal Expansion of solid using Interference method.
8. Susceptibility of solid using Guoy Balance.
9. Amplitude Modulation.
10. Waveform Generation and Hysteresis studies using Schmitt Trigger.
11. Solving Simultaneous equations using Op Amp.
12. Solving Differential equations using Op Amp.
13. Oscillator using Op Amp
14. Sample and Hold circuit using Op-amp.
15. Up and Down Counters
16. Programming Logic Array

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER III
CORE COURSE
MDPH31 - SOLID STATE PHYSICS - I
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial) : 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: describe elastic / thermal properties, parameters of different crystals / materials/waves/lattice

CO2[K2]: derive parameters of inert gas/ionic/semiconductor crystals, elastic waves/lattice and different models

CO3[K3]: determine parameters of different crystals/elastic waves/lattice, heat capacity, electrical and thermal properties of different materials/models

CO4[K4]: examine elastic waves/lattice, thermal/electrical parameters of different crystals/ models/materials, and carrier concentrations.

CO5[K5]: interpret parameters of different types of crystals/elastic waves/waves/lattice and models

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**39**	**33**	**33**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.56**	**5.83**	**6.73**	**2.36**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I: **(15L+3T)**

Wave Diffractions and the Reciprocal lattice:

Diffraction of Waves by Crystals – The Braggs law – Diffraction condition -Brillouin Zones: Reciprocal lattice to sc Lattice- Reciprocal lattice to bcc Lattice - Reciprocal lattice to fcc Lattice- Fourier Analysis of the Basis –Structure factor of the bcc lattice- Structure factor of the fcc lattice- Atomic Form Factor

Unit II:

Crystal Binding and elastic constants : **(15L+3T)**

Crystals of inert gases: Vander waals – London Interaction, Repulsive Interaction Equilibrium Lattice Constants Cohesive energy – Ionic crystals: Electrostatic or Madelung energy – Evaluation of the Madelung constant – Analysis of elastic strains – Dilation-stress components- Elastic compliance and stiffness constants – Elastic Energy density – Elastic Stiffness constants of cubic crystals – Bulk modulus and compressibility.

Unit III:

Elastic constants and Crystal Vibrations: **(15L+3T)**

Elastic waves in cubic crystals –Waves in [100] Direction – Waves in [110] Direction- Vibrations of crystals with Monatomic basis: First Brillouin zone–Group velocity–Long wavelength limit-Derivation of force constants from experiment – Two atoms per primitive basis-Quantization of Elastic Waves.

Unit IV:

Thermal Properties: **(15L+3T)**

Phonon heat capacity: Planck distribution– Normal mode enumeration–Density of states in one dimension–Density of sates in three dimensions–Debye model for density of states– Debye T^3 law– Einstein model of the density of states – General result for $D(\omega)$.

Unit V:

Free Electron Fermi Gas: **(15L+3T)**

Energy levels in one dimension – Effect of temperature on the Fermi – Dirac distribution – Free electron gas in three Dimensions– Heat capacity of the electron gas: Experimental heat capacity of metals- Heavy fermions– Electrical conductivity and Ohm's law.

Energy Bands:

Nearly free electron model: Origin of the energy gap- Magnitude of the energy gap– Bloch functions- Kronig – Penney model – Wave equation of electron in a periodic potential:– Solution of the central equation–Kronig–Penney model in reciprocal space.

Text Book:

Charles Kittel - Introduction to Solid State Physics
Edition 2019
Wiley India Pvt. Limited, New Delhi

Reference Books:

1. S.O. Pillai - Solid State Physics
New Age International (P) Limited Publishers, New Delhi Revised Sixth Edition, 2005
2. S.L. Kakani, C.Hemrajani -Solid State Physics
Fourth Edition 2005
Sultan Chand & Sons

3. J.P. Srivastava - Elements of Solid State Physics
Prentice Hall of India Private Limited
2nd Edition
7th Printing July 2008

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Explanation of different types of crystals	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of crystal bindings	II	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of Elastic waves in cubic crystals	III	Mind Maps/Video/ Presentation/ Interactive Quizzes
Determination of parameters of different models	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of Heat capacity	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M.Sc., PHYSICS
SEMESTER-III
CORE COURSE
MDPH32- QUANTUM MECHANICS - II
(For those who have joined in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture hour + Tutorial) : 90 (75+15)
Total number of Number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain various approximation methods for scattering problems and perturbation theory for time evolution problems.
CO2[K2]: describe the correspondence between quantum states & vectors in Hilbert space, transformation and symmetries, properties & matrix representation of angular momentum and relativistic theories.
CO3[K3]: apply appropriate approximation methods to various collision and perturbation problems and relativistic theories to obtain plane wave solution of Hydrogen like atom.
CO4[K4]: analyze the asymptotic behavior of wave functions in collision problems, geometrical aspect of state vectors & wave functions, transformations and conservation laws.
CO5[K5]: assess the properties of angular momentum operators, various pictures of time evolution, Dirac matrices, plane wave solution of relativistic wave equations.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	0	0	0	0	1
CO2	9	3	3	0	0	0	1
CO3	9	9	9	3	0	0	1
CO4	9	9	9	3	0	0	1
CO5	9	9	9	3	0	0	1
Weightage of the course	**37**	**31**	**30**	**9**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.28**	**5.48**	**6.12**	**4.25**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

UNIT-I **(15L+3T)**

Scattering Theory

The Scattering Cross Section: General Considerations: Kinematics of the Scattering Process: Differential and Total Cross Sections - Wave mechanical picture of scattering: The scattering amplitude - Green's Functions; Formal expression for scattering amplitude. **The Born and Eikonal Approximations:** The Born approximation - Validity of the Born approximation - The Born series - The Eikonal approximation - **Partial Wave Analysis:** Asymptotic behavior of partial waves: Phase Shifts - The scattering amplitude in terms of phase shifts - The differential and Total cross sections; Optical Theorem.

UNIT-II **(15L+3T)**

Representations, Transformations and Symmetries:

Quantum States: State Vectors and Wave Functions - The Hilbert Space of State vectors; Dirac notation - Dynamical variables and linear operators - Representations - Continuous basis - The Schrödinger representation - Degeneracy; Labeling by commuting observables - Change of basis; Unitary transformations - Unitary transformations induced by change of coordinate systems: Translations - Unitary transformation induced by rotation of coordinate system -The algebra of rotation generators - Transformation of dynamical variables - Symmetries and Conservation laws - Space inversion - Time reversal.

UNIT-III **(15L+3T)**

Angular Momentum

The eigen value spectrum - Matrix representation of J in the |jm> Basis - Spin Angular Momentum - Non relativistic Hamiltonian with spin; Diamagnetism - Addition of Angular Momenta - Spin Wave Functions for a system of Two Spin-1/2 particles - Identical particles with spin.

UNIT-IV **(15L+3T)**

Evolution with Time

Perturbation theory for time Evolution Problems: Perturbative solution for transition amplitude - Selection Rules - First Order Transitions: Constant perturbation - Transitions in the second order: Constant perturbation - Harmonic Perturbations - Interaction of an Atom with Electromagnetic Radiation - The Dipole Approximation: Selection Rules - **Alternative Picture of Time Evolution:** The Schrödinger Picture - The Heisenberg Picture - The Interaction Picture.

UNIT-V **(15L+3T)**

Relativistic Wave Equations:

Generalisation of the Schrodinger Equation - The Klein - Gordon Equation: Plane wave solutions: Charge and Current Densities - Interaction with Electromagnetic Fields; Hydrogen like Atom - The Dirac equation: Dirac's Relativistic Hamilton - Position Probability Density; Expectation values - Dirac matrices - Plane wave solutions of the Dirac Equation; Energy spectrum - The Spin of the Dirac particle - Significance of Negative Energy States; Dirac Particle in Electromagnetic Fields: Relativistic Electron in a Central Potential: Total Angular Momentum..

Text Book :

A Text book of Quantum Mechanics - P.M.Mathews & K.Venkatesan - Tata McGraw Hill Education Private Limited, New Delhi (2010) – II edition.

Reference Books:

1. Leonard I. Schiff - Quantum Mechanics
   McGraw Hill International Editions
   Third Edition, 1968
2. John L.Powell & Crasemann - Quantum Mechanics
   Narosa Publishing House, Ninth Reprint 1998
3. Sathya Prakash - Advanced Quantum Mechanics
   Kedar Nath Ram Nath Publishers, Meerut
   Fifth Revised and enlarged Edition 1999

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Kinematics of the Scattering Process: Differential and Total Cross Sections	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
Unitary transformations: Rotation, Translation	II	Video/ Presentation/ Interactive Quizzes
Matrix representation of J	III	Solving problems/Presentation/ Interactive Quizzes
Alternative Picture of Time Evolution	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes
Dirac equation and Matrices, Spin of the Dirac particle	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN(AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER – III
CORE COURSE
MDPH33 – COMPUTATIONAL PHYSICS AND MICROPROCESSOR
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour+tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial) : 90 (75+15)
Total number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain C++ with syntax and examples, numerical solution for different types of equations, algorithms/errors, 8085 MPU and I/O devices.
CO2[K2]: outline C++ data types, numerical methods of solving equations, 8085 programming model.
CO3[K3]: apply appropriate numerical techniques to solve different types of equations.
CO4[K4]: analyze algorithms and programs in C++, numerical methods and 8085 features.
CO5[K5]: appraise the features of C++, numerical methods, 8085 MPU architecture, memory and I/O devices.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	0	0	1
CO2	9	3	3	3	0	0	1
CO3	9	9	9	3	0	0	0
CO4	9	9	9	3	0	0	1
CO5	9	9	9	3	0	0	1
Weightage of the course	**39**	**33**	**33**	**15**	**0**	**0**	**4**
Weighted percentage of Course contribution to POs	**5.56**	**5.83**	**6.73**	**7.08**	**0**	**0**	**5.33**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I : **(15L+3T)**

Tokens, Expressions and Control Structure:

Introduction – Tokens - Keywords – Identifiers and Constants – Basic Data Types – User-Defined Data Types – Derived Data Types – Symbolic Constants – Declaration of Variables – Dynamic Initialization of Variables.

Functions in C++:

Introduction – The Main Function – Function Prototyping – Call by Reference – Return by Reference – Inline Functions – Default Arguments – const Arguments – Recursion – Function Overloading.

Unit II : **(15L+3T)**

Classes and Objects:

Introduction – Defining Member Functions – A C++ Program with class – Making an Outside Function Inline – Nesting of Member Function – Private Member Functions – Arrays within a Class – Memory Allocation for Objects – Static Data Members – Static Member Functions – Arrays of Objects – Objects as Function Arguments – Friendly Functions.

Unit III: **(15L+3T)**

Iterative Methods and Direct method:

The method of successive bisection – Newton-Raphson iterative method - The Gauss elimination method.

Interpolation:

Introduction – Lagrange interpolation – Difference table.

Unit IV : **(15L+3T)**

Least Squares Approximation of Functions:

Introduction – Linear regression - Polynomial regression – Fitting exponential function only.

Differentiation and integration:

Formulae for numerical differentiation – Numerical integration - Trapezoidal rule, Simpson's rule.

Numerical solution of Differential Equations:

Runge-Kutta methods – Runge-Kutta secondorder formula – Runge-Kutta fourth order formula.

Unit V : **(15L+3T)**

Introduction to 8085 Assembly Language Programming:

The 8085 programming model – Instruction Classification – Instruction, Data Format and Storage - To write, Assemble and Execute a simple program – Overview of the 8085 Instruction Set – Writing and Hand Assembling a Program.

Microprocessor Architecture and 8085 Microprocessor Architecture:

Microprocessor Architecture and its Operations – Memory – Input and Output (I/O) Devices-The 8085 MPU.

Text Books:

Unit I, Unit II

1. E.BalaguruSamy - Object Oriented Programming with C++ Tata McGraw Hill Education Pvt. Ltd. Fifth Edition

Unit III , Unit IV

2. V.Rajaraman - Computer Oriented Numerical Methods
PHI Learning Private Limited, New Delhi.
Forty First Printing (Third Edition) - January 2011.

Unit V

3. Ramesh Gaonkar - Microprocessor Architecture, Programming and Applications with the 8085, Penram International Publishing (India) Private Limited, (Fifth Edition), March 2011.

Reference Books:

1) M.K.Jain, S.R.K.Iyengar and R.K.Jain - Numerical Methods for Scientific and Engineering Computation – V Ed. New Age International Publishers
2) S.Arumugam, A.Thangapandi Isaac A.Smasundaram – Numerical methods,2nd edition, reprint 2010-Scitech Publications (India) Pvt Ltd, Chennai.

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
C++ data types	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
Recursion	II	Mind Maps/Video/ Presentation/ Interactive Quizzes
Some pitfalls in computing	III	Mind Maps/Solving problems/Presentation/ Interactive Quizzes
Predictor-corrector method	IV	Mind Maps/Solving problems /Video/ Presentation/ Interactive Quizzes
8085 Microprocessor architecture	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER III
CORE COURSE
MDPH3L - ADVANCED PHYSICS LAB – III
(Any 12 experiments)
(For those admitted in June 2020 and later)

Contact hours per week : 06
Total number of hours per semester : 90
Total number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: write assembly language programs for microprocessor, C++ programs for solving numerical equations and draw circuits.
CO2[K3]: implement the programs and construct the circuits.
CO3[K4]: analyze the observed data and report the results.
CO4[K5]: interpret the results following laboratory ethics
CO5[K5]: examine the outputs for different inputs.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	0	1	1
CO2	9	3	9	3	0	1	1
CO3	9	9	9	3	0	1	1
CO4	9	9	9	3	0	1	1
CO5	9	9	9	3	0	1	1
Weightage of the course	**39**	**33**	**39**	**15**	**0**	**5**	**5**
Weighted percentage of Course contribution to POs	**5.56**	**5.83**	**7.96**	**7.08**	**0**	**25**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

List of experiments

1. Numerical Integration using C++ program
2. Numerical differentiation using C++ program
3. Solving Simultaneous Equations using C++ program
4. Curve Fitting using C++ program
5. Ascending and descending order using µp
6. Multiplication and division using µp
7. Character Display using µp
8. Rolling display using µp
9. Interfacing experiments using µp **-2 problems**
10. Implementation of Boolean Expression using Multiplexer
11. Implementation of Boolean Expression using De Multiplexer
12. Study of Encoder
13. Study of Decoder.
14. Ultraviolet spectral analysis **-1 sample**
15. Infrared spectral analysis **-1 sample**
16. Serial – in – Serial out register
17. Serial – in – Parallel out register
18. Fuel Cell characteristics
19. A/D Converter using IC0801
20. D/A converter using IC0808
21. BCD to binary conversion
22. Binary to BCD Conversion
23. Binary to Gray code and Gray to Binary code using IC7486
24. Binary to Excess 3 using IC7483
25. Flip-Flop using NAND/NOR gates
26. Modulus counter and Decade counter using 7490

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, (AUTONOMOUS) SIVAKASI.
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER – III
CORE ELECTIVE COURSE
MDPH3E1– MATERIALS SCIENCE AND IPR
(For those admitted in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial) : 90 (75+15)
Total number of number of credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: describe the classification, characteristics, applications of materials and concepts of research

CO2[K2]: explain materials characterizations, concepts of fuel cells and research ethics

CO3[K3]: identify the different materials, its characterization and IPR

CO4[K4]: analyze various materials, structures, fuel cells and the types of IPR& plagiarism

CO5[K5]: appraise property rights and nature of materials from different characterization

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	1	0	1
CO2	9	3	3	0	1	0	1
CO3	9	9	9	0	1	0	1
CO4	9	9	9	0	1	0	1
CO5	9	9	9	0	1	0	1
Weightage of the course	**37**	**33**	**33**	**0**	**5**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.28**	**5.83**	**6.73**	**0**	**25**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

UNIT I: (15L+3T)

Classification and Selection of Materials

Introduction – Engineering requirements – Classification of Engineering materials – Polymeric (Plastic materials) – Electronic materials – Biomaterials – Composite materials – Level of material structure examination and observation – Material structure – Engineering metallurgy – Selection of materials

UNIT II: **(15L+3T)**

Organic Materials: Polymers and Elastomers

Introduction – Polymers – broad classifications – basic concepts of polymer science – molecular configurations – thermoplastic and thermosetting polymers – copolymers – polymer crystallinity – defects in polymers –polymer types – miscellaneous applications of polymers – Advanced polymeric materials.

UNIT III: **(15L+3T)**

Characterization of Materials:

X-Ray diffraction – Differential Scanning Calorimetry – Thermogravimetric analysis. Atomic Absorption / Emission Spectroscopy (AAS/AES) – Flame Atomization – UV-visible Absorption Spectroscopy.

UNIT IV: **(15L+3T)**

Fuel Cells:

Introduction – Fuel cell – Potential applications – Classification of fuel cells: Phosphoric acid fuel cell (PAFC), Alkaline fuel cell (AFC), Polymer electrolyte membrane fuel cell (PEMFC), Molten carbonate fuel cells (MCFC), Solid oxide fuel cell (SOFC) – Development stages and Relative performance of various fuel cells – Fuels for fuel cells – Efficiency of a fuel cell – V-I characteristics of fuel cell – Present status – Hydrogen energy – Properties of Hydrogen – Storage – Applications – Present status.

UNIT V: **(15L+3T)**

Research Ethics & Intellectual Property Rights (IPR):

Meaning of Research – Objectives of research – Types of research – Significance of research – Research Process – Elements of a research problem – Characteristics of research problem – Criteria of Good research – The importance of Research Ethics – Plagiarism and its types – How to avoid Plagiarism – Research proposal – Interpretation – Significance of report writing – Layout of research report - Intellectual property (IP) – Types of intellectual property – Importance of intellectual property rights – Copyrights : Definition, History.

Text books:

Unit –I & II

1. Material Science (Science and Engineering of Materials) – S.L.Kakani& Amit Kakani, New Age International Publishers, Third Edition 2016.

Unit –III

2. Principles of Materials Science -S.Mohan, V.Arjunan, Sujin P.Jose, M.Kanchana Mala, MJP Publishers, Chennai, 2013

Unit –IV

3. Non-conventional Energy Resources - B H Khan, McGraw Hill Education (India) Private Limited, New Delhi

Unit –V **- Study material will be provided**

Reference Books

1. G.K. Narula, K.S. Narula, V.K. Gupta - Materials Science, Tata McGraw-Hill Publishing Company Ltd., 27th Reprint, 2007.
2. A. Marikani - Materials Science, PHI Learning Pvt.Ltd., 2017

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Biomaterials/Composite materials	I	Mind Maps/Video/ Presentation
Polymers/ Advanced polymeric materials	II	Mind Maps/Video/ Presentation
X-Ray diffraction, Thermal analysis	III	Presentation/Video
Fuel cell, Hydrogen energy	IV	Mind Maps/Video/ Presentation
Plagiarism and its types, Intellectual property	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER – III
CORE ELECTIVE COURSE
MDPH3E2 - RECENT TRENDS IN PHYSICS
(For those admitted in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial) : 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K2]: explain the basic concepts of simulation and applications of nanotechnology
CO2[K2]: describe various nano lithographic techniques, modeling, smart materials and self healing structures
CO3[K3]: solve problems using simulation
CO4[K4]: analyze the applications of nanotechnology in optics and electronics
CO5[K4]: classify system simulation and discrete system simulation, sensors

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	1	0	1
CO2	9	3	3	0	1	0	1
CO3	9	9	9	0	1	0	1
CO4	9	9	9	0	1	0	1
CO5	9	9	9	0	1	0	1
Weightage of the course	**37**	**33**	**33**	**0**	**5**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.28**	**5.83**	**6.73**	**0**	**25**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I:
System Simulation: (15L+3T)

Simulation of a Pure Pursuit Problem- an example – A System and its Model – Simulation of an Inventory Problem – The basic Nature of Simulation– Simulation of Continuous Systems - A Chemical Reactor – Numerical integration vs. Continuous System Simulation – Selection of an Integration formula – Runge-Kutta integration formula.

Unit II:

Discrete System Simulation: (15L+3T)

Simulation of a Servo System – Simulation of a Water Reservoir System – Analog vs. Digital Simulation – Fixed time-step vs. event-to-event model – On Simulating randomness – Generation of random numbers – Generation of non -uniformly distributed random numbers – Monte Carlo computation vs. Stochastic Simulation.

Unit III:

Nanotechnology: (15L+3T)

Nano Definition - A Different kind of small size – Electrons – Atoms and Ions – Molecules – Metals – Bio systems – Molecular Recognition – Electrical Conduction and Ohm's law - Scanning Probe Instruments – Spectroscopy – Electrochemistry – Electron Microscopy -The Return of Scanning Probe Instruments – Nano scale Lithography – Dip Pen Nanolithography – E-Beam Lithography – Nano sphere Liftoff Lithography – Molecular Synthesis – Self Assembly – Nanoscale Crystal Growth – Polymerization – Nano bricks and Building Blocks – Nano CAD.

Unit IV:

Optics and Electronics: **(15L+3T)**

Light Energy, its capture and Photo Voltaics – Light production – Light Transmission – Light Control and manipulation – Electronics – Carbon Nano tubes – Soft Molecule Electronics – Memories – Gates and Switches – Architectures - Smart materials – Sensors – Nano scale Biostructures – Energy capture, Transformation and Storage – Optics – Magnets – Fabrication - Electronics –Modeling –Self Healing structures - Recognition – Separation – Catalysts – Heterogeneous nanostructures and composites – Encapsulation – Consumer goods.

Unit V:

Sensors and Biomedical Applications: (15L+3T)

Natural Nano scale sensors - Electromagnetic sensors – Biosensors – Electronic noses - Drugs – Drugs Delivery – Photodynamic Therapy - Molecular motors – Neuro Electronic Interfaces – Protein Engineering – Nano luminescent Tags.

Text Books :

Unit I & Unit II

1. Narsingh Deo - System Simulation with Digital Computer – Prentice-Hall of India Private Limited (New Delhi) – Seventeenth Printing

Unit III, Unit IV & Unit V

2. Mark Ratner & Daniel Ratner - Nanotechnology - Pearson Education (Singapore) Third Impression 2008

Reference Books:

1. D S Hira - System Simulation, S.Chand Publishing, 2009, NewDelhi
2. Charles P.Poole, Jr., & Frank J.Owens - Introduction to Nanotechnology Wiley India P.Ltd, reprint 2010, NewDelhi

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Numerical integration vs. Continuous System Simulation	I	Presentation
Simulation of a Water Reservoir System	II	Video/ Presentation
Lithography	III	Mind Maps/Video/ Presentation
Smart materials	IV	Video/ Presentation/ Scrap book
Sensors and Biomedical Applications	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN(AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER – IV
CORE COURSE
MDPH41 - SOLID STATE PHYSICS - II
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture hour + Tutorial) : 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: describe orbits, energy bands of metals, survey of superconductor, parameters of magnetic materials/different particles/waves

CO2 [K2]: explain properties/parameters of metals, magnetic materials, different particles/ waves.

CO3[K3]: determine Fermi surfaces and metals, super conductivity and different magnetic materials and different particles/waves.

CO4[K4]: analyze parameters of metals, super conductivity, magnetic materials, plasmons, polaritons and polarons/waves.

CO5[K5]: interpret different parameters of different materials and different particles/waves.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	0	0	0	1
CO2	9	3	3	0	0	0	1
CO3	9	9	9	3	0	0	1
CO4	9	9	9	3	0	0	1
CO5	9	9	9	3	0	0	1
Weightage of the course	**39**	**33**	**33**	**9**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.56**	**5.83**	**6.73**	**4.25**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I :

Semiconductor Crystals: (15L+3T)

Band gap – Equations of motion: Physical derivation of $\hbar$ k = F -Holes- Effective mass– Physical interpretation of the effective mass– Effective masses in semiconductors– Silicon and Germanium – Intrinsic carrier concentration: Intrinsic mobility – Impurity conductivity: Donor states– Acceptor states.

Unit II:

Fermi Surfaces and Metals: (**15L+3T)**

Reduced Zone scheme- Periodic Zone scheme – Construction of Fermi surface: Nearly free Electrons – Electron orbits, hole orbits and open orbits – Calculation of energy bands: Tight binding method of energy bands, Wigner- Seitz method – Experimental methods in Fermi surface studies: Quantization of orbits in a magnetic field, De Haas-van Alphen effect – Extremal orbits.

Unit III:

Super Conductivity: (15L+3T)

Experimental Survey: Occurrence of super conductivity -Destruction of superconductivity by magnetic fields – Meissner effect – Heat capacity – Energy gap.

Theoretical survey: Thermodynamics of the superconducting transition – London equation – Coherence length – BCS theory of superconductivity – BCS ground state – Flux quantization in a superconducting ring – Type II superconductors – Vortex state – Estimation of H_{C1}, H_{C2}. – Josephson superconductor tunneling – DC Josephson effect – AC Josephson effect.

Unit IV:

Diamagnetism and Paramagnetism: (**15L+3T)**

Langevin diamagnetism equation – Quantum theory of dimagnetism of mononuclear systems – Paramagnetism – Paramagnetic susceptibility of conduction electrons

Ferromagnetism

Ferromagnetic order: Curie point and the exchange integral, Temperature dependence of the saturation magnetization, Saturation magnetization at absolute zero – Magnons: Quantisation of Spin Waves—Thermal Excitation of Magnons- Ferromagnetic domains: Anisotropic Energy-Transition region between Domains-Origin of domains.

Unit V:

Plasmons, Polaritons and Polarons: (15L+3T)

Dielectric function of the electron gas: Definitions of the Dielectric function- Plasma Optics, Dispersion relation for electromagnetic waves, Transverse optical modes in a plasma, Transparency of alkali metals in the Ultraviolet, Longitudinal plasma oscillations – Plasmons -Electrostatic screening: Screened Coulomb potential - Screening and phonons in metals –Polaritons: LST relation - Electron –phonon interaction, Polarons.

Text Book:

Charles Kittel - Introduction to Solid State Physics
Edition 2019
Wiley India Pvt. Limited, New Delhi

Reference Books:

1. S.O. Pillai - Solid State Physics
Revised Sixth Edition, 2005
New Age International (P) Limited Publishers, New Delhi
2. S.L. Kakani, C.Hemrajani - Solid State Physics
Fourth Edition 2005
Sultan Chand & Sons
3. J.P. Srivastava - Elements of Solid State Physics
2nd Edition

7th Printing July 2008
Prentice Hall of India Private Limited

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Discussion of Semiconductor Crystals	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of Fermi surfaces	II	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of Theoretical survey of Super conductors.	III	Mind Maps/Video/ Presentation/ Interactive Quizzes
Discussion of different magnetic materials	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes
Analysis of different particles	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc PHYSICS
SEMESTER IV
CORECOURSE
MDPH42 – NUCLEAR AND PARTICLE PHYSICS
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture hour + Tutorial) : 90 (75+15)
Total number of number of credits : 05

Course Outcomes (CO):

CO1[K2]: outline the basic definitions in nuclear and particle Physics
CO2[K2]: describe the concepts of nuclear forces, nuclear models, nuclear reactions, nuclear decay, elementary particles and Quarks
CO3[K3]: classify the different types of nuclear forces, reactions, models, decays and elementary particles
CO4[K4]: analyze simple problems in nuclear and particle Physics
CO5[K5]: appraise the different types of scatterings, models, cross- sections, nuclear decay and elementary particles

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	1	0	0	0
CO2	3	3	3	1	0	0	0
CO3	9	3	3	1	0	0	1
CO4	9	3	3	1	0	0	0
CO5	9	3	3	1	0	0	0
Weightage of the course	**33**	**13**	**13**	**5**	**0**	**0**	**1**
Weighted percentage of Course contribution to POs	**4.71**	**2.3**	**2.65**	**2.36**	**0**	**0**	**1.33**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit– I : (15L+3T)

Nuclear Forces:

Deuteron (Properties, No excited S-States, Excited States of the Deuteron) - Neutron-Proton Scattering at Low Energies (Partial wave Analysis, Scattering length, Determination of phase shift, Spin dependence) - Proton-Proton Scattering at Low Energies (phase shift analysis) - Neutron-Neutron Scattering (Similarity between (nn) and (pp) forces) - Saturation of Nuclear Forces (Exchange Forces, Isotopic Spin Formalism) – Meson theory of exchange forces.

Unit II: **(15L+3T)**

Nuclear Models:

Fermi gas model - Liquid drop model - Shell model [Evidence for the existence of Magic numbers, nuclear properties, Extreme Single Particle model (Square well potentials of infinite depth, Harmonic Oscillator Potential, Spin-Orbit Potential), Predictions of the Shell Model] - Collective Nuclear Model (Rotational States only).

Unit III: **(15L+3T)**

Nuclear Reactions:

Types of Nuclear Reactions - Conservation Laws - Nuclear Reaction Kinematics -Nuclear Cross-Section - Classical Analysis of Cross-Section - Partial wave Analysis of Reaction Cross-Section - Compound Nucleus - Resonance Cross- Sections: Breit Wigner Dispersion Formula (Resonance Cross-sections, Elastic Resonance Scattering, Low Energy Neutron Reactions).

Unit IV: **(15L+3T)**

Nuclear Decay

Alpha decay energy and mass number – Alpha particle spectra – Gamow's theory of alpha decay – Advances in the theory of alpha decay – The Neutrino – Fermi theory of beta decay – General theory of beta decay – Electron Capture – Violation of parity conservation in beta decay – Double beta decay.

Unit V: **(15L+3T)**

Elementary Particles:

Classification of Elementary Particles – Fundamental Interactions (Gravitational, Electromagnetic, strong, weak) - Conservation Laws (Conservation of Isospin, Conservation of Strangeness, Conservation of Hypercharge, Charge Conjugation- Space-inversion Invariance (parity)- Combined Inversion (CP)- Time Reversal- Combined Inversion of CPT) - Elementary Particle Symmetries - Quarks – Isospin of Quarks - Quark Wave functions of Pseudo Scalar Mesons - Quark Wave functions of Baryons.

Text Book:

1. D. C. Tayal - Nuclear Physics, Himalaya Publishing House Pvt. Ltd. Fifth Revised & Enlarged Edition: 2008, Reprint, 2012.

Reference Books:

1. R.R. Roy and B.P. Nigam - Nuclear Physics (Theory and Experiment), New Age International (P) Ltd Publishers, First Edition – 1967, Reprint, 2011.
2. Irving Kaplan - Nuclear Physics, Addison Wesley Publishing Company, Second Edition, 1962.
3. Satya Prakash - Nuclear Physics and Particle Physics, Sultan Chand & Sons, First Edition, 2005.
4. V. Devanathan - Nuclear Physics, Narosa Publishing Company Pvt. Ltd. First Edition, 2006.

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Deuteron	I	Mind Maps/Video/ Presentation
Magic number/ Liquid drop model	II	Mind Maps/Video/ Presentation
Types of Nuclear Reactions	III	Presentation/Video
Electron Capture, Alpha and Beta decay	IV	Mind Maps/Video/ Presentation
Classification of Elementary Particles, Fundamental Interactions, Quarks	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M. Sc. PHYSICS
SEMESTER IV
CORE COURSE
MDPH43 - MOLECULAR SPECTROSCOPY
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester (Lecture hour + Tutorial): 90 (75+15)
Total number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: explain the basic elements of spectroscopy, nature of interaction of various radiations on different types of molecules and the experimental techniques
CO2[K2]: obtain the energy expressions for interacting molecules using microwave, infrared, Raman, electronic and spin resonance spectroscopic method
CO3[K3]: estimate the factors like interatomic distance, absorption energy etc. from various spectral data
CO4[K4]: analyze the structure and intensity of rotational, vibrational, electronic spectra and spin resonance spectra of molecules
CO5[K5]: deduce the structure of molecules using spectroscopic data

CO-PO Mapping table (Course Articulation Matrix)

Pos / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	0	0	0
CO2	9	9	3	3	0	0	1
CO3	9	9	9	3	0	0	1
CO4	9	9	9	3	0	0	1
CO5	9	9	9	3	0	0	1
Weightage of the course	**39**	**39**	**33**	**15**	**0**	**0**	**4**
Weighted percentage of Course contribution to POs	**5.56**	**6.89**	**6.73**	**7.08**	**0**	**0**	**5.33**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I:

Introduction: (15L+3T)

Basic elements of Practical Spectroscopy- Signal to noise: Resolving power – The width and intensity of spectral transitions- Fourier Transform Spectroscopy

Microwave spectroscopy:

Rotation of molecules – Rotational spectra – Diatomic molecules – Polyatomic molecules – Techniques and instrumentation

Unit II:

Infrared spectroscopy: (15L+3T)

The vibrating diatomic molecule – The diatomic vibrating rotator – The vibration rotation spectrum of carbon monoxide – Break down of the born – Oppenheimer approximation – The vibrations of poly atomic molecules – The influence of rotation on the spectra of polyatomic molecules – Analysis by Infrared techniques – Techniques & instrumentation.

Unit III:

Raman spectroscopy: (15L+3T)

Introduction – Pure rotational Raman spectra –Vibrational Raman Spectra – Polarization of light and the Raman spectra – Structure determination from Raman and Infra-red Spectroscopy – Techniques and instrumentation – Near – Infra-red FT – Raman spectroscopy.

Unit IV:

Electronic spectra of molecules: (15L+3T)

Born – Oppenheimer approximation – vibrational coarse structure – Intensity of Vibrational Electronic Spectra: Franck – Condon Principle – dissociation energy and dissociation products – Rotational Fine Structure of electronic vibration transition - Predissociation.

Unit V:

Spin-resonance Spectroscopy: (15L+3T)

Spin and applied field: Nature of spinning particles, Interaction between Spin and a magnetic field – Population of energy levels – The Larmor Precession – relaxation times – Fourier transform spectroscopy in NMR – multiple pulse FT - NMR of hydrogen nuclei - Chemical shift – coupling constant –Techniques and Instrumentation - Electronic Spin Resonance Spectroscopy.

Text Book:

Colin N.Banwell and Elanie M.McCash – Fundamentals of Molecular Spectroscopy
Fourth Edition, Fourth Reprint 2017
Tata McGraw Hill Publishing Company Limited

Reference Books:

1. G.Aruldas - Molecular Structure & Spectroscopy
Prentice-Hall of India
6th printing 2005

2. B.P.Staughan and S.Walker - Spectroscopy –Volume II,
London Chapman and Hall A
Halsted Press book, John Wiley and Sons Inc., 1976

Tutorials:

Topic	Unit	Constructive Alignment - Learning Activity
Rotation of different types of molecules	I	Models
Influence of rotation on vibration of molecules	II	Case Study/Presentation/video
Structure determination using Raman and IR	III	Case Study/Presentation
Effect of dissociation on electronic spectrum	IV	Powerpoint Presentation/Quiz
Relaxation technique	V	Mind Maps/Video/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
M. Sc. PHYSICS
SEMESTER IV
CORE COURSE
MDPH4P - PROJECT AND VIVA VOCE
(For those admitted in June 2020 and later)

Contact hours per week : 06
Total number of hours per semester : 90
Total number of credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to
CO1[K3]: identify the nature of the problems and collect relevant data
CO2[K3]: utilize the collected data and manipulate them to arrive the solution
CO3[K4]: analyze the data with the literature survey
CO4[K5]: justify the results in the project report in an ethical manner
CO5[K6]: defend their dissertations in viva-voce

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	0	3	0	1
CO2	9	3	3	0	3	0	1
CO3	9	9	9	9	3	3	1
CO4	9	9	9	9	3	3	1
CO5	9	9	9	9	3	3	1
Weightage of the course	**39**	**33**	**33**	**27**	**15**	**9**	**5**
Weighted percentage of Course contribution to POs	**5.56**	**5.83**	**6.73**	**12.74**	**75**	**45**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Rules governing Project Report

1. During fourth semester, the students have to undertake project individually / in a group by selecting a problem of their choice pertaining to this discipline. Each group shall contain a maximum of two students.
2. The project report should be free from plagiarism and the students should check results and discussion part of their report against plagiarism in the library before one week of submission. The plagiarism report should be enclosed along with the project report.
3. Two copies of the project report with 30-40 pages excluding bibliography and appendices should be submitted on or before the last working day of the students.
4. The project report shall be evaluated by the guide and the external examiner for 50 marks. The *Viva-voce* examination shall be conducted jointly by the guide and external examiner for 50 marks.
5. For a pass in the project, each student should secure a minimum of 50% of marks.
6. If a student fails to get a minimum pass mark, she may be permitted to resubmit her project report once again within the period of six months after the publication of results.
7. If a student fails to submit the project report within the stipulated time the candidate can submit the same after getting permission from the Chief Controller of Examinations along with the fine.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN(AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER IV
CORE ELECTIVE COURSE
MDPH4E1 – NANO PHYSICS
(For those admitted in June 2020 and later)

Contact hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial): 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: describe the classification/properties/fabrication/characterization/ applications of nanoparticles.

CO2[K2]: explain the features, applications and technical studies of individual nanoparticles, nanostructures and nano materials.

CO3[K3]: apply the physical and characterization techniques in nanomaterials.

CO4[K4]: inspect the studies of Nanoparticles.

CO5[K5]: appraise the basics of nano and features of nano technology.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**37**	**31**	**31**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.28**	**5.48**	**6.33**	**2.36**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit-I

Introduction to Nano and Classification **(15L+3T)**

Introduction – Emergence of Nanotechnology – Bottom-Up and Top-Down Approaches – Classification of nanostructures– Nanoscale architecture.

Unit – II

Properties of Individual Nanoparticles **(15L+3T)**

Metal Nanoclusters: Magic Numbers – Theoretical Modeling of Nanoparticles – Geometric Structure – Electronic Structure – Semi conducting Nanoparticles – Rare gas and molecular clusters.

Unit-III

Nanostructures Fabricated by Physical techniques **(15L+3T)**

Introduction – Lithography – Nanomanipulation and Nanolithography – Soft Lithography, Assembly of Nanoparticles and Nanowires – Other Methods for Microfabrication.

Unit-IV

Characterization and Properties of Nanomaterials **(15L+3T)**

Introduction – Structural Characterization – Chemical Characterization – Physical Properties of Nanomaterials – Electrical Conductivity – Ferroelectrics – Dielectrics and Super paramagnetism.

Unit-V

Applications of Nanomaterials **(15L+3T)**

Introduction – Molecular Electronics and Nano Electronics – Nanobots – Biological Application of Nanomaterials – Catalysis by Gold Nanoparticles – Band Gap Engineered Quantum Devices – Quantum Well and Quantum Dot – Nanomechanics – Carbon Nanotube Emitters – Photoelectrochemical Cells – Photonic Crystals and Plasma Waveguides.

Text Books:

1. Huozhong Gao - Nanostructures and Nanomaterials Imperial College Press (2004).
2. R.W. Kelsall, I.W. Hamley and M. Geoghegan - Nanoscale Science and Nanotechnology (John-Wiley & Sons, Chichester, 2005.
3. Charles P.Poole, Jr., & Frank J.Owens - Introduction to Nanotechnology WileyIndiaP.Ltd, Reprint 2010, NewDelhi

Reference Books:

1. Richard Booker and Earl Baysen – Nanotechnology, Wiley Dreamtech India (P) Ltd (2005 Edition)
2. C. Suryanarayananan and C.C. Koch - Nano crystalline Materials, Current Research and future directions – Hyperfine Interactions Journal

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Classification of nanostructures	I	Mind Maps/Video/ Presentation
Molecular clusters	II	Mind Maps/Video/ Presentation
Microfabrication	III	Presentation/Video
Structural Characterization	IV	Mind Maps/Video/ Presentation
Nanobots	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER IV
ELECTIVE COURSE
MDPH4E2 – MEDICAL PHYSICS
(For those admitted in June 2020 and later)

Contact hours per week(Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial): 90 (75+15)
Total number of credits : 05

Course Outcomes (CO):

On successful completion of the course, the learners should be able to

CO1[K2]: explain the physiological effects of ultrasound in therapy
CO2[K2]: describe the theory of light in medical applications
CO3[K3]: apply an insight on various aspects of radiology
CO4[K4]: analyze the physical principles of the instruments used in medical diagnosis & therapy
CO5[K5]: interpret the physics behind radiation therapy

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	1	0	0	1
CO2	9	3	3	1	0	0	1
CO3	9	9	9	1	0	0	1
CO4	9	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**37**	**31**	**31**	**5**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**5.28**	**5.48**	**6.33**	**2.36**	**0**	**0**	**6.67**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit I: (15L+3T)

Sound in Medicine:

General properties of sound, The body as a drum (Percussion in Medicine),The stethoscope, Ultrasound pictures of the body, Ultrasound to measure motion, Physiological effects of ultrasound in therapy, The production of speech.

Physics of the ear and Hearing:

The outer ear, the middle ear, the inner ear, sensitivity of the ears, testing your hearing, deafness and hearing aids.

Unit II:

Light in Medicine: (15L+3T)

Measurement of light and its units, applications of visible light in medicine, applications of ultraviolet and infrared light in medicine, lasers in medicine, applications of microscopes in medicine

Unit III: (15L+3T)

Physics of diagnostic X-rays:

Production of X-ray beams, how x-ray are absorbed, making an x-ray image, radiation to patients from x-rays.

Unit IV: (15L+3T)

Physics of Nuclear Medicine (Radio isotopes in Medicine):

Review of basic characteristics and units radioactivity, sources of radioactivity for nuclear medicine, basic instrumentation and its clinical applications

Unit V: (15L+3T)

Physics of Radiation Therapy:

The dose units used in radiotherapy - the red and the gray, principles of radiation therapy, a short course in radiotherapy treatment planning, megavoltage therapy, short distance radio therapy or branchy therapy.

Text Book :

John R. Cameron and James G. Skofronick – Medical Physics ,
A Wiley –Interscience Publication,
John Wiley &Sons, New York (1978).

Reference Books:

1) M.Arumugam - Biomedical Instrumentation, Anuradha Publishing Co., Kumbakonam, Tamilnadu, 2004.

2) Jerrold T.Bushberg - The essentials of medica imaging, Third edition, LWW publisher (2011).

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Sound in Medicine	I	Mind Maps/Video/ Presentation
Light in Medicine	II	Mind Maps/Video/ Presentation
Radiation to patients from x-rays	III	Presentation/Video
Radio isotopes in Medicine	IV	Mind Maps/Video/ Presentation
Radiation Therapy	V	Mind Maps/Video/ Presentation

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER – II
ELECTIVE COURSE
MDPH2E1 - APPLIED PHYSICS
(For those admitted in June 2020 and later)

Contact Hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total number of hours per semester(Lecture hour + Tutorial): 90 (75+15)
Total number of Credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: explain the various optical and medical instruments, various types of communication
CO2[K2]: describe the working of optical and medical instruments, fibre optics and various communication systems
CO3[K3]: solve problems related to fibre optics and communication system
CO4[K4]: compare various telescopes, scanning methods, classification of holograms, types of optical fibre and power budget calculation
CO5[K5]: appraise the effect of optical phenomenon and medical instrumentation in their relevant field

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	0	0	0	0
CO2	3	0	0	0	0	0	0
CO3	3	1	1	0	0	0	0
CO4	3	3	3	3	0	0	0
CO5	9	3	3	3	0	0	0
Weightage of the course	**19**	**7**	**7**	**6**	**0**	**0**	**0**

Based on the level of contribution (9-High, 3-Medium, 1-Low)

Unit – I

Optical Instruments (15L+3T)

Camera-Camera lenses-Size of an object- The simple magnifier-Telescopes-refracting astronomical telescope-reflecting telescope - Newton's telescope-other reflecting telescope-constant deviation spectrometer

Holography

Introduction – Principle of Holgraphy-Recording of the Hologram-Reconstruction of the image-Holograms-important Properties of Hologram-Classification of Holograms-Applications-Medical applications of holography

Unit – II **(15L+3T)**

Fibre Optics

Introduction-Optical fibre-Necessity of cladding-Optical fibre system-optical fibre cable-Total internal reflection-Propagation of light through an optical fibre-Critical angle of propagation-Acceptance angle- Numerical aperture-types of rays-Classification of optical fibres-The three types of fibres-single mode setp index fibre-multimode step index fibre-Graded index fibre-Materials-All glass fibre-all plastic fibres-PCS fibres-Fabrication-Applications-Illumination and image transmission-Optical communications- medical applications-military applications

Unit – III

Satellite Communications **(15L+3T)**

Kepler's First Law, Second Law, Third Law – Orbits, Geostationary orbit – Power Systems – Attitude control – Satellite station keeping – Antenna look angles – Limits of visibility – Frequency plans and Polarization – Transponders – Uplink Power Budget calculations – Downlink Power Budget calculations – Overall Link budget calculations

Unit – IV **(15L+3T)**

Facsimile and Television

Facsimile transmission – Scanning – Cylindrical scanning – Electronic CCD scanning – The scanning spot – Facsimile receiver – Photographic recording – Transmission of Facsimile telegraph signals – Digital fax transmission.

Unit – V

Medical Instrumentation **(15L+3T)**

Electrocardiography –Origin of cardiac action potential-ECG Lead configurations-ECG recording set up– Types of ECG recorders – Principles of Ultrasonic measurement-Basic modes of transmission – Ultrasonic imaging – Ultrasonic Diagnosis - Magnetic Resonance Imaging(MRI)-Magnetic resonance phenomenon-Magnetic resonance spectroscopy- Magnetic resonance imaging-Magnetic relaxation and MRI Parameters- MRI Instrumentation

Text Books:

Unit – I, Unit - II

1. Dr.N.Subrahmanyam, Brijlal Dr.M.N.Avadhanulu - A Textbook of Optics, S.Chand& Company PVT.LTD. Twenty fifth Revised Edition 2012,Reprints 2015

Unit – III, Unit - IV

2. Dennis Roddy & John Coolen - Electronic Communications, Prentice-Hall of India Private Limited, Fourth edition, 2003

Unit – V - Study material to be provided.

Reference books:

1. M. Armugam - Biomedical Instrumentation Anuradha Agencies, Second Edition 2002

2. John G. Webstar, Editor - Medical Instrumentation, John Wiley and Sons Third edition 1999
3. Neerai Mehta - Applied Physics for Engineers Prentice Hall India Learning Private Limited;1edition, (2011)
4. Wayne Tomasi - Advanced Electronic Communication systems , Prentice Hall of India Private Limited, Sixth Edition 2004

Study material will be provided for all five units

Tutorials:

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Explanation of Camera	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
Classification of optical fibres	II	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of Kepler's Lawlinear	III	Mind Maps/Video/ Presentation/ Interactive Quizzes
Working of Photographic recording	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of ECG recorders	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI.
DEPARTMENT OF PHYSICS
SEMESTER – II
ELECTIVE COURSE
MDPH2E2 - MICROCONTROLLER
(For those admitted in June 2020 and later)

Contact Hours per week (Lecture hour + Tutorial) : 06 (05+01)
Total no. of hours per semester (Lecture + Tutorial) : 90 (75+15)
Total no. of Credits : 05

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1[K2]: explain the architecture and instruction set of the microcontroller Intel 8051.
CO2[K2]: write the assembly language programming for the microcontroller Intel 8051.
CO3[K3]: implement the features of 8051.
CO4[K4]: analyse interrupts sources and interrupt vector addresses.
CO5[K5]: disseminate different programmable devices and methods to interface them.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	0	0	0	0
CO2	3	0	0	0	0	0	0
CO3	3	1	1	0	0	0	0
CO4	3	3	3	3	0	0	0
CO5	9	3	3	3	0	0	0
Weightage of the course	**19**	**7**	**7**	**6**	**0**	**0**	**0**

Unit I :
Introduction to 8051 microcontrollers: (15L+3T)

Introduction- Intel's MCS -51 Series Microcontrollers –Intel 8051 architecture- Memory Organization –Internal RAM Structure- Power Control in 8051- Stack Operation.

Unit II :
8051 instruction set and programming: (15L+3T)

Introduction- Addressing Modes of 8051- Instruction Set of 8051-Some Assembler Directives- Programming Examples using 8051 Instruction Set.

Unit III :
Hardware features of 8051: (15L+3T)

8051 Timers - Timer SFRs - Timer Operating modes - Timer control and operation - Using timers as counters - Programming examples.

Unit IV :

8051 interrupts: (15L+3T)

Interrupts sources and interrupt vector addresses – Enabling and disabling of interrupts –Interrupt priorities and polling sequence- Timing of Interrupts- Programming examples- 8051 Serial Ports.

Unit V :

8051 interface examples: (15L+3T)

Interfacing 8255 with 8051 – Interfacing of Push Button Switches and LEDs- Interfacing of Seven _segment Displays -Interfacing ADC Chip – Interfacing DAC Chip – Interfacing stepper motor with 8051 - Microcontroller Application Example - Traffic light control.

Text Books :

N.Senthil Kumar - Microprocessors and Microcontrollers
M.Saravanan Oxford University Press 2010
S.Jeevananthan

Reference Books:

1. Raj kamal - Microcontrollers, architecture, Programming, interfacing & system design - Pearson education,2005

2. A.P.Godse, D.A. Godse - Microprocessors & Microcontrollers Technical Publications. 1st edition 2010

Topic	**Unit**	**Constructive Alignment - Learning Activity**
Explanation of intel 8051 architecture	I	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation addressing Modes of 8051	II	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of Timer Operating modes	III	Mind Maps/Video/ Presentation/ Interactive Quizzes
Explanation of Enabling and disabling of interrupts	IV	Mind Maps/Video/ Presentation/ Interactive Quizzes
Interfacing of Seven _segment Displays	V	Mind Maps/Video/ Presentation/ Interactive Quizzes

Marks are recorded for each student in each learning activity and which can be taken as assignment marks