

**SCOTT CHRISTIAN COLLEGE (AUTONOMOUS)
NAGERCOIL**



(Estd. 1893)

**CURRICULUM AND SYLLABUS
DEPARTMENT OF PHYSICS & RESEARCH CENTRE
(Approved by the Standing Committee of the Academic Councils
held on 21.10.2023 & 13.01.2024)
UNDERGRADUATE PROGRAMME
CBCS-SEMESTER SYSTEM
(For those who join from 2023 to 2026)**

An evolution towards revolution ...

Education is crucial for attaining full human potential, developing an unbiased and evenhanded society and promoting national and global development. The education sector in India is witnessing a sweeping wave of change. The very first policy for education, *National Policy on Education* (NPE-1968) was promulgated in 1968, with the National Policy on Education (NPE- 1986) following in 1986. The National Policy on Education (NPE- 1992) and the Programme of Action 1992 (POA-1992) refined and implemented the NPE-1986. The National Education Policy 2020 (NEP 2020) is a landmark document and an evolution towards revolution in the Indian educational sector. It presents the vision for greater access, equity, excellence, inclusion, multiple entry and exit and affordability to help India emerge as the global knowledge superpower.

Providing access to quality education is the key to the curriculum and syllabus of Scott Christian College (Autonomous), in terms of social justice and equality, scientific advancement, cultural preservation and national and global integration. Students should have the freedom and flexibility in choosing their courses, skills, and capacities to become moral, successful, innovative, adaptable, and productive human beings.

Higher education plays an important role in promoting human as well as societal wellbeing and in contributing towards sustainable livelihoods and economic development. The present Outcome-Based Education (OBE) curriculum and syllabus, provides valuable insights and recommendations on aspects of education that include moving towards multidisciplinary and holistic education, mastery and high-order learning and promotion of quality research.

The current curriculum has been designed based on NEP 2020, the National Credit Framework (NCrF), the National Higher Education Qualifications Framework (NHEQF) and Curriculum and Credit Framework for Undergraduate Programmes (CCFUP) which envisage that students must develop into good, thoughtful, well-rounded, creative individuals with a standard of achievement. The themed curriculum aims to support teachers and students in developing their understanding of the curriculum design and delivery process as per the requirement of the world of work.



Dr. Sidney Shirly
Dean of Arts
Scott Christian College
(Autonomous)
Nagercoil



Dr. V. Robin Perinba Smith
Dean of Science
Scott Christian College
(Autonomous)
Nagercoil



Dr. B. Shamina Ross
Dean of IT and Technical Education
Scott Christian College
(Autonomous)
Nagercoil

DEPARTMENT OF PHYSICS & RESEARCH CENTRE

Physics is one of the basic and fundamental sciences. The curriculum for the under graduate and post graduate Programmes in Physics is revised as per the UGC guidelines on Learning Outcome based Course Framework. The learner-centric courses let the student progressively develop a deeper understanding of various aspects of Physics.

The new curriculum offers courses in the core areas and it will train students with sound theoretical and experimental knowledge that suits the need of academics and industry. In addition to the theoretical course work, the students also learn physics laboratory methods for different branches of physics, specialized measurement techniques, analysis of observational data, including error estimation and etc. The students will have deeper understanding of laws of nature through the subjects like classical mechanics, quantum mechanics, statistical physics etc. The problem-solving ability of students will be enhanced. The students can apply principles in physics to real life problems. The restructured courses with well-defined objectives and learning outcomes provide guidance to prospective students in choosing the elective courses to broaden their skills not only in the field of physics but also in interdisciplinary areas. The elective modules of the framework offer students choice to gain knowledge and expertise in specialized domains of physics like astrophysics, medical physics, etc.

The learner centric courses are designed to enable the students to progressively develop a good understanding of the concepts of various domains in physics. Significant modification is the inclusion of the courses to equip students to face challenges in industries and make them employable. Skill development in different spheres and confidence building are given a special focus.

VISION:

- ❖ Reform, transform and empower the young minds by imparting quality education.

- ❖ Upbringing the overall personalities of the students by providing state of the art learning experience.
- ❖ Inculcate universal brotherliness and tolerance with highest standard of integrity

MISSION:

- ❖ Reaching out to the unreached by providing equal opportunity to learn irrespective of the caste and creed.
- ❖ Create social interaction, environmental sustainability, economic progress, and scientific awareness through varied curriculum.
- ❖ Provide transferable skills, life skills, e-skills and soft-skills through diverse learning experience.
- ❖ Promote experimental learning, field-trips and internships to foster entrepreneurship and self-reliance.
- ❖ Foster critical thinking and effective communication by advance teaching and learning process.

ELIGIBILITY:

For B.Sc. – Applicants must have completed their higher secondary in the Science stream (Either PCM or PCB subject group) and have Physics as a compulsory subject with an aggregate score of 50%.

DURATION OF THE PROGRAMME:

3 Years (IV Semesters) for B.Sc. Physics

MEDIUM:

English for both B.Sc. & M.Sc. Degree Programmes in Physics

FACULTY MEMBERS

Sl. No.	NAME	DESIGNATION
1.	Prof. A. CHARLES HEPZY ROY	Faculty Head i/c Associate Professor
2.	Dr. C. JAMES	Associate Professor
3.	Dr. C. BESKY JOB	Associate Professor
4.	Dr. Y. PREMILA RACHELIN	Associate Professor
5.	Dr. J.V. BYNAJA	Associate Professor
6.	Dr. V. ANSLIN FERBY	Associate Professor
7.	Dr. B.S. BENILA	Associate Professor
8.	Dr. Y. SHEEBA SHERLIN	Associate Professor
9.	Dr. T. R. BEENA	Assistant Professor
10.	Dr. S. SHARMILA JULIET	Assistant Professor
11.	Dr. D.J. JEEJAMOL	Assistant Professor
12.	Dr. H. ADLINE MAHIBA	Assistant Professor
13.	Dr. D. HUDSON OLIVER	Assistant Professor

MEMBERS OF THE BOARD OF STUDIES

Sl. No.	NAME	AFFILIATION	ROLE
1.	Prof. A. Charles Hepzy Roy	Faculty Head i/c Department of Physics & Research Centre Scott Christian College (Autonomous), Nagercoil. charleshepzyroy@scottchristian.org +91 9944261881	Chairman
2.	Dr. C. James	Associate Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. james@scottchristian.org +919489500237	Member
3.	Dr. C. Besky Job	Associate Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. cbjob1969@gmail.com +919487026024	Member
4.	Dr. Y. Premila Rachelin	Associate Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. premlarachelin@scottchristian.org 9489620591	Member
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7.	Dr. B.S. Benila	Associate Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. benila@scottchristian.org +919843626563	Member
8.	Dr. Y. Sheeba Sherlin	Associate Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. sheebasherlin@scottchristian.org 9442304397	Member
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10.	Dr. S. Sharmila Juliet	Assistant Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. sharmilajuliet@scottchristian.org 9487094860	Member
11.	Dr. D.J. Jeejamol	Assistant Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. jeejamol@scottchristian.org +917598629087	Member
12.	Dr. H. Adline Mahiba	Assistant Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil. adline@scottchristian.org +919408657877	Member
13.	Dr. D. Hudson Oliver	Assistant Professor of Physics Department of Physics & Research Centre Scott Christian College (Autonomous) Nagercoil., +919952654515 hudsonoliver@scottchristian.org	Member
14.	Dr. C. Ravidhas	Faculty Head PG & Research Department of Physics Bishop Heber College (Autonomous) Thiruchirapalli - 620 017 cavidhas@gmail.com +919443076209	Subject Expert
15.	Dr. I. Hubert Joe	Associate Professor Department of Physics University of Kerala Thiruvananthapuram - 695 034 hubertjoe@gmail.com +919447220563	Subject Expert
16.	Dr. R. Sheela Christy	Professor and Head, Department of Physics & Research Centre, Nesamony Memorial Christian College, Marthandam - 629165 sheelachristy64@yahoo.com +91 9442382469	Vice- nancellor's Nominee
17.	Mr. D. Gilbert Chandra	Group Head, Instrumentation, ISRO Propulsion Complex, Mahendragiri- 627 133 gilbertd26@gmail.com +919442180572	Representa tive
18.	Dr. V. Shally	Assistant Professor, Department of Physics & Research Centre, Holy Cross College (Autonomous), Kurusady, Nagercoil - 629 002., shally.v@holycrossngl.edu.in +917598854466	Post Graduate Meritorious Alumnus

The Scott Christian College (Autonomous) defines the focus reinforcing its academic Programmes and student life experience on campus through the Graduate Attributes (GA), that describe the knowledge, competencies, values and skills students imbibe for holistic development, multidisciplinary development and contribution to society. These attributes comprise characteristics that are transferable beyond the sphere of study into the national and international realm through curricular, co-curricular and extra-curricular engagements. They equip graduates for life long personal development and employment. Every Graduate of Scott Christian College (Autonomous) – (SCC) is desired to possess the following Graduate Attributes:

GA 1: Intellectual Competencies

Graduates of SCC

- have a comprehensive and incisive understanding of their domain of study as well as the ability for cross-disciplinary learning
- have the ability to apply the knowledge acquired through the curriculum as well as self-directed learning to a broad spectrum ranging from analytical thinking to synthesize new knowledge through research
- are able to have critical, independent and individual outlook regarding academic work and socially relevant issues

GA 2: Problem Solving

Graduates of SCC

- have the capacity to extrapolate from what has been learnt, translate concepts to real-life situations and apply acquired competencies in the required contexts to generate solutions to specific problems
- can view a problem or a situation from multiple perspectives and think 'out of the box' and generate solutions to complex problems in unfamiliar contexts
- are effective problems-solvers, able to apply critical, creative and evidence-based thinking to conceive innovative responses to challenges

GA 3: Communication Skills

Graduates of SCC

- listen carefully, analyse texts and research papers, and present complex information in a clear and concise manner
- express thoughts and ideas effectively in writing and orally and communicate with others using appropriate media
- confidently express herself/himself and construct logical arguments using correct technical language related to a field of learning and area of professional practice

GA 4: Environmental Awareness

Graduates of SCC

- lessen the effects of environmental degradation, climate change, and pollution
- learn the nuances for cleanliness, conservation and wise use of resources so that it can be used for generations
- know the nuances of waste management, conservation of biological diversity, management of biological resources and biodiversity, and sustainable development and living

GA 5: Professional Ethics

Graduates of SCC

- develop principled and expert behaviour, and this will be showcased in their chosen careers and constructive roles as citizens of the world at large
- imbibe intellectual integrity and ethics in scholarly engagement and develop a spirit of inclusiveness through interactions with diverse people at all levels in life
- acquire new knowledge and skills, including 'learning how to learn' skills, for pursuing learning activities throughout life and adapting to changing demands of the workplace through knowledge, skill development and reskilling, ethically

GA 6: Leadership Qualities

Graduates of SCC

- inculcate leadership qualities and attitudes, and team behaviour along autonomous lines through curricular, co-curricular and extra-curricular activities
- develop managerial and entrepreneurial skills to create new opportunities for diverse careers and gear up to take up competitive examinations
- act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

GA 7: Holistic Skill Development

Graduates of SCC

- develop critical thinking, problem-solving capacity, effective communication, and social skills
- are self-aware, flexible, resilient and have the capacity to accept and give constructive feedback and cope up with stress
- develop soft skills, e-skills and life skills to live, learn and work in the technically sound society globally and use appropriate digital methods for analysis of data

GA 8: Cross-Cultural Competencies

Graduates of SCC

- gain cross-cultural competencies through engaging with diverse linguistic, ethnic and religious communities and know how to understand, accept and appreciate individuals at local, national and international levels
- develop a global perspective through contemporary curriculum, culture, language and international exchange programmes
- acquire knowledge of the values and beliefs of multiple cultures and a global perspective to honour diversity, gender sensitivity and adopt gender-neutral approach and show empathy to the less advantaged and the differently-abled

GA 9: Community Engagement

Graduates of SCC

- are sensitive to social concerns and have conviction toward social justice through active social engagement
- are endowed with a strong sense of environmental awareness through the curriculum and a friendly and serene campus eco-system.
- formulate an inspiring vision and build a team that can help achieve the vision, and motivate people to the right destination

GA 10: Value-Based Ethical Competency

Graduates of SCC

- are rooted in the principles of ethical responsibility and integrity permeated with Christian values leading to the building of character and constitutional values
- develop virtues such as truth, love, courage, unity, integrity, brotherhood, industry and uprightness
- practice responsible national and global citizenship required for responding to contemporary challenges, enabling learners to become aware of and understand global issues and to become active promoters of more peaceful, tolerant, inclusive, secure, and sustainable societies

Learning Outcomes Descriptors for Qualification at Level 4.5 on the NHEQF

An Undergraduate Certificate is awarded to students who have demonstrated the achievement of the outcomes located at level 4.5 on the NHEQF.

ELEMENT OF THE DESCRIPTOR	NHEQF LEVEL DESCRIPTORS RELATING TO UNDERGRADUATE CERTIFICATE
Knowledge and Understanding	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • knowledge of facts, concepts, principles, theories, and processes in broad multidisciplinary learning contexts within the chosen fields of learning • understanding linkages between the learning areas within and across the chosen fields of study, • procedural knowledge required for performing skilled tasks associated with the fields of learning.
General, Technical and Professional Skills	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • cognitive, rational and technical skills required to identify, analyze and synthesize information and to accomplish tasks relating to the fields of learning. • cognitive and technical skills required for selecting and using relevant methods, tools, and materials • apply the acquired technical and theoretical knowledge and use basic methods, tools, materials, and information to generate solutions to specific problems relating in the field of learning.
Generic Learning Outcomes	<p>The graduates should be able to demonstrate the ability to:</p> <ul style="list-style-type: none"> • listen carefully, read texts related to the chosen fields of study analytically, and present information in a clear and concise manner • express thoughts and ideas effectively in writing and orally and present the results/findings of the experiments carried out • make judgment and take decisions, based on analysis of data and evidence, for formulating responses to issues/problems associated with the chosen fields of learning
Constitutional, humanistic, ethical, and moral values	<p>The graduates should be able to demonstrate the willingness to:</p> <ul style="list-style-type: none"> • practice constitutional, humanistic, ethical, and moral values in real-life situations, • put forward convincing arguments to respond to the ethical and moral issues associated with the chosen fields of learning • use reason and empathy, considering the consequences of human actions and the likely impact on other people and animals
Employability and Entrepreneurship Skills	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • knowledge and essential skills, required to perform effectively in a defined job relating to the chosen fields of study, • ability to exercise responsibility for the completion of assigned tasks and for the outputs of own work, and to take some responsibility for group work and output as a member of the group • transferable skills and key personal attributes which are highly valued by employers and essential for effective performance in the workplace.
Credit Requirements	<ul style="list-style-type: none"> • The successful completion of the first year (two semesters) of the undergraduate programme of minimum 40 credit hours
Entry Requirements	<ul style="list-style-type: none"> • Certificate obtained after successful completion of Grade 12 or equivalent state of education.

Learning Outcomes Descriptors for Qualifications at Level 5 on the NHEQF

An Undergraduate Diploma is awarded to students who have demonstrated the achievement of the outcomes located at level 5 on the NHEQF.

ELEMENT OF THE DESCRIPTOR	NHEQF LEVEL DESCRIPTORS
Knowledge and Understanding	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> theoretical and technical knowledge in multidisciplinary contexts deeper knowledge and understanding of the learning areas and its underlying principles and theories procedural knowledge required for performing skilled tasks
Application of Knowledge and Skills	<p>The graduates should be able to demonstrate the ability to:</p> <ul style="list-style-type: none"> apply the acquired specialized or theoretical knowledge, and a range of cognitive and practical skills to gather quantitative and qualitative data, select and apply basic methods, tools, materials, and information to formulate solutions to problems related to the chosen field(s) of learning. analyse and synthesize ideas and information from a range of sources and act on information to generate solutions to problems
Generic Learning Outcomes	<p>The graduates should be able to demonstrate the ability to:</p> <ul style="list-style-type: none"> listen carefully, read texts and present complex information in a clear and concise manner in writing and orally critically evaluate the essential theories, policies, and practices by following a scientific approach to knowledge development. make judgement and take decision, based on the analysis and evaluation of information, for determining solutions to a variety of unpredictable problems associated with the chosen fields of learning
Constitutional, Humanistic, Ethical, and Moral values	<p>The graduates should demonstrate the willingness and ability to:</p> <ul style="list-style-type: none"> embrace constitutional, humanistic, ethical, and moral values and practice these values in life ethically address issues relating to the chosen fields of learning, including environmental and sustainable development issues use reason and empathy, considering the consequences of human actions and the likely impact on other people and animals
Employability and Entrepreneurship Skills	<p>The graduates should be able to demonstrate the acquisition of skill sets that are necessary to:</p> <ul style="list-style-type: none"> take up employment relating to the chosen fields of study or professional practice exercise self-management within the guidelines of study and work contexts. take responsibility for the evaluation and improvement of work or study activities
Credit Requirements	<p>The successful completion of the first two years (four semesters) of the undergraduate programme involving a minimum of 80 credit hours</p>
Entry Requirements	<p>Continuation of study or lateral entry in the second year of the undergraduate programme will be possible for those who have met the entrance requirements, including specified levels of attainment, specified in the programme regulations.</p>

Learning Outcomes Descriptors for Qualification at Level 5.5 on the NHEQF

The Bachelor's degree is awarded to students who have demonstrated the achievement of the outcomes located at level 5.5 on the NHEQF.

ELEMENT OF THE DESCRIPTOR	NHEQF LEVEL DESCRIPTORS
Knowledge and Understanding	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • comprehensive, factual, theoretical, and specialized knowledge in broad multidisciplinary contexts with depth in the underlying principles and theories relating to the fields of learning. • knowledge of the current and emerging issues and developments within the chosen field of learning. • procedural knowledge required for performing and accomplishing professional tasks in the chosen fields of learning.
General, Technical and Professional Skills	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • cognitive and technical skills required for performing and accomplishing complex tasks • cognitive and technical skills required to evaluate and analyse complex ideas and generate solutions • measurable abilities and knowledge that come through learning and can be job or task-specific
Application of Knowledge and Skills	<p>The graduates should be able to demonstrate the ability to:</p> <ul style="list-style-type: none"> • apply the acquired theoretical knowledge, and cognitive and practical skills to gather and analyse quantitative and /or qualitative data • employ the right approach to generate solutions to problems related to the fields of learning • develop through practice, experience, and the effective utilization of acquired knowledge to perform specific tasks, solve problems, or exhibit competence
Generic Learning Outcomes	<p>The graduates should be able to demonstrate the ability to:</p> <ul style="list-style-type: none"> • communicate in writing and orally the constructs and methodologies adopted for the studies undertaken relating to the chosen fields of learning, • make coherent arguments to support the findings/results of the study undertaken and pursue self-paced and self-directed learning to upgrade knowledge and skills and pursue higher level of education and training. • make judgement and take decisions based on the analysis and evaluation of information for formulating responses to problems based on empirical evidence
Constitutional, Humanistic, Ethical, and Moral Values	<p>The graduates should be able to demonstrate the willingness and ability to:</p> <ul style="list-style-type: none"> • Embrace constitutional, humanistic, ethical, and moral values, and practice these values in life. • formulate coherent arguments about ethical and moral issues, including environmental and sustainable development issues, • follow ethical practices in all aspects of research and development
Employability and Entrepreneurship Skills	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • knowledge and essential skills set and competence that are necessary to take up a professional job • entrepreneurship skills required for setting up and pursuing self-employment • the ability to exercise management and supervision in the contexts of work or study activities involving unpredictable work processes and working environments.
Credit Requirements	<p>The successful completion of the first three years (six semesters) of the undergraduate programme involving a minimum of 120 credit hours</p>
Entry Requirements	<p>Continuation of study or lateral entry into the third year of the undergraduate programme will be possible for those who have met the specified levels of attainment, specified in the programme admission regulations</p>

Learning Outcomes Descriptors for a Qualification at Level 6 on the NHEQF

The Bachelor's degree (Honours / Honours with Research) or the Post-Graduate Diploma is awarded to students who have demonstrated the achievement of the outcomes located at level 6 on the NHEQF.

ELEMENT OF THE DESCRIPTOR	NHEQF LEVEL DESCRIPTORS
Knowledge and Understanding	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • advanced knowledge about a specialized field of enquiry, with depth in one or more fields of learning within a broad interdisciplinary context. • a coherent understanding and awareness of the established methods and techniques of research and enquiry • procedural knowledge required for performing and accomplishing professional tasks
General, Technical and Professional Skills	<p>The graduates should be able to demonstrate the acquisition of:</p> <ul style="list-style-type: none"> • a range of cognitive and technical skills required for performing and accomplishing complex tasks required to undertake research to generate solutions to real-life problems • generating solutions to complex problems independently, requiring the exercise of full personal judgement, responsibility, and accountability for the output of the initiatives taken as a practitioner • apply advanced knowledge relating to research methods to carry out research and investigations to formulate evidence-based solutions to complex and unpredictable problems
Generic Learning Outcomes	<p>The graduates should be able to demonstrate the ability to:</p> <ul style="list-style-type: none"> • communicate technical information and explanations, and the findings/ results of the research studies relating to specialized fields of learning and pursue self-paced and self-directed learning • present in a concise manner one's views on the relevance and applications of the findings of research and evaluation studies in the context of emerging developments and issues. • define problems, formulate appropriate and relevant research questions, formulate hypotheses, test hypotheses using quantitative and qualitative data, establish hypotheses, make inferences based on the analysis and interpretation of data, and predict cause-and-effect relationships
Constitutional, manistic, Ethical, and Moral Values	<p>The graduates should be able to demonstrate the willingness and ability to:</p> <ul style="list-style-type: none"> • embrace and practice constitutional, humanistic, ethical, and moral values in professional practice and life. • present coherent arguments in support of relevant ethical and moral issues and participate in actions to address environmental and sustainable development issues. • follow ethical practices in all aspects of research and development,
Employability and Entrepreneurship Skills	<p>The graduates should be able to demonstrate the acquisition of knowledge and skills required for:</p> <ul style="list-style-type: none"> • adapting to the future of work and to the demands of the fast pace of technological developments and innovations that drive a shift in employers' demands for skills • managing complex technical or professional activities or projects • should be willing to take a calculated risk and be open to new ideas
Credit Requirements	<p>A Post-Graduate Diploma programme builds on a 3-year/6-semester bachelor's degree and requires a minimum of 40 credits for individuals who have completed a Bachelor's programme.</p>

Entry Requirements

- An individual seeking admission to the bachelor's degree (Honours/ Honours with Research) in a specified field of learning would normally have completed all requirements of the relevant 3-year Bachelor's degree.

PLO & GA Mapping for B.Sc. Physics

PROGRAMME LEARNING OBJECTIVE #	PROGRAMME LEARNING OBJECTIVE (PLO)	DESCRIPTION OF PLO	PLO MAPPED WITH GA#
PLO 1	Scientific language proficiency	Exhibit spoken and written skills for effective communication	GA 3
		Relate reading and listening skills to expedite access to knowledge resources and understanding	GA 3
		Combine two or more language abilities while interacting	GA 3
PLO 2	Critical thinking and domain knowledge	Acquire knowledge of basic concepts, theories and processes through study of core courses in respective programmes and have a critical outlook	GA 1 GA 2
		Critically relate and consider domain specific knowledge to emerging areas of academia	GA 1
		Evaluate, familiarize and develop domain specific transferrable skills to new and or unfamiliar contexts	GA 2
PLO 3	Interdisciplinary knowledge	Identify and determine connection across disciplines	GA 1 GA 8
		Empower students to combine frameworks and concepts from multiple disciplines to examine and solve a problem from different perspectives	GA 1 GA 8 GA 2
		Procure and apply interdisciplinary knowledge for universal development	GA 1 GA 8
PLO 4	Digital competency	Acquire the ability to leverage digital technologies to communicate, collaborate, and analyse data	GA 7 GA 1 GA 2
		Get acquainted with software resources, computational skills and digital tools	GA 7 GA 1
		Ethically apply digital skills to confidently use technology for work, learning and daily life	GA 7 GA 10
PLO 5	Analytical skills	Develop the ability to think critically and relate learning to academic, professional and real-life problem solving	GA 1 GA 10 GA 2
		Apply empirical knowledge and skills to identify and collect quantitative and qualitative	GA 7 GA 2

		data to analyse and formulate evidence-based suggestions and solutions	
		Analyse problems and come out with facts-based solutions	GA 2 GA 7
PLO 6	Academic writing & presentation skills	Formulate and document results, case studies, project works, field works and internships	GA 2
		Present ideas, analyse research and construct an effective argument	GA 3
		Keep focused, planned and structured by using effective methodologies and in formal presentations	GA 2 GA 1
PLO 7	Innovation and creativity	Validate convertible capabilities and entrepreneurial skills that are needed for employment opportunities	GA 2 GA 7
		Develop and generate intellectual property	GA 1
		Empower entrepreneurs to discover opportunities, solve problems, adapt to change, continuously improve, and drive business growth	GA 2 GA 5
PLO 8	Social engagement and responsibility	Exhibit the ability to link classroom learning with social concerns and engagement through service learning and outreach programmes	GA 5 GA 9
		Enhance positive leadership qualities for peaceful coexistence, general wellbeing and improved quality of life	GA 6 GA 10
		Have ethical responsibility, philanthropic responsibility and economic responsibility	GA 5 GA 9
PLO 9	Environmental sensitization	Appreciate environmental consciousness and sustainability	GA 4 GA 9
		Make students acquire sensitivity to the environment and its problems and help them to acquire a set of values for environmental protection	GA 4 GA 9
		Encourage students to acquire knowledge of pollution and environmental degradation	GA 4
PLO 10	Autonomy and Responsibility	Demonstrate a sense of community service, be proactive and creative at work, committed to lifelong learning	GA 5 GA 10 GA 6
		Encourage independent thought, problem-solving, creative thinking and productive teamwork	GA 5 GA 1 GA 2
		Reflect the basic human need to have control over our own lives both at work and in life	GA 7 GA 10

METHODS OF EVALUATION

Evaluation	Methods	Marks
Internal	Continuous Internal Assessment Test	40
	Assignments / Snap Test / Quiz	
	Seminars	
External	End Semester Examination	60
Total		100

B.Sc. Physics CURRICULUM TABLE

Year	Semester	Module	Courses	Course Code	Hours							Total Hours	Credits	Credit Points
					Lecture	Tutorial	Practical	Internship	Self-Learning	Demonstration	Research Project			
I	I	1.1	MIL-1: Part I Language Tamil/Malaya /Hindi	23LT11/23LM11 /23LH11	6							6	3	13.5
		1.2	CE-1: Part II Language	23LE11	5		1					6	3	13.5
		1.3	Core Course 1 Properties of Matter & Sound	23GP11	4							4	4	18
		1.4	Core Course 2 Atomic Physics	23GP12	4							4	4	18
		1.5	Core Course 3 Practical I- Properties of Matter	23GPP1			4					4	2	9
		1.6	Allied Mathematics -		4		2					6	5	22.5
		Total											30	21
I	II	2.1	MIL-2: Part I Language Tamil/English/Hi	23LT21/23LM21 /23LH21	6							6	3	13.5
		2.2	CE-2: Part II Language	23LE21	5		1					6	3	13.5

Framework/ Credit distribution for B.Sc. Physics (2023 onwards)

**First Year
Semester - I
(Credit Level 4.5)
[Credit × Credit Level = Credit Point]**

		PAPER TITLE	CREDI	CREDIT POINTS	Hrs
Part I	First Language MIL - 1	Tamil / Malayalam / Hindi	3	13.5	6
Part II	Second Language CE - 1	English	3	13.5	6
Part III	Core Course - 1 CC - 1	Properties of Matter & Sound	4	18	4
	Core Course - 2 CC - 2	Atomic Physics	4	18	4
	Core Course - 3 CC - 3	Practical - I Properties of Matter	2	9	4
Total			16	72	24
Part IV	Minor Stream (Allied) MS - 1	Allied Mathematics - I	5	22.5	6
Total			21	94.5	30

**II SEMESTER
CREDIT DISTRIBUTION FOR B.Sc. PHYSICS
CREDIT LEVEL - 4.5**

		PAPER TITLE	CREDITS	CREDIT POINTS	Hrs
Part I	First Language MIL - 2	Tamil / Malayalam / Hindi	3	13.5	6
Part II	Second Language CE - 2	English	3	13.5	6
Part III	Core Course - 4 CC - 4	Thermal Physics	4	18	4
	Core Course - 5 CC - 5	Optics	4	18	4
	Core Course - 6 CC - 6	Practical - II Thermal Physics	2	9	4
Part IV	Minor Stream (Allied) MS - 2	Allied Mathematics - II	5	22.5	6
Total			21	94.5	30

**III SEMESTER
CREDIT DISTRIBUTION FOR B.Sc. PHYSICS
CREDIT LEVEL - 5**

		PAPER TITLE	CREDITS	CREDIT POINTS	Hrs
Part I	First Language MIL - 3	Tamil / Malayalam / Hindi	3	15	6
Part II	Second Language CE - 3	English	3	15	6
Part III	Core Course – 7 CC - 7	Classical & Quantum Mechanics	4	20	4
	Core Course – 8 CC - 8	Nuclear Physics	4	20	4
	Core Course – 9 CC- 9	Practical - III Optics	2	10	2
Part IV	Minor Stream (Allied) MS - 3	Allied Chemistry - I	5	25	6
Part V	Skill Enhancement Courses SEC - I	Simple House Wiring	1	5	2
Part VI	Value Added Courses VAC - I	Health and Fitness Through Yogasanas	1	5	0
Total			23	115	30

**IV SEMESTER
CREDIT DISTRIBUTION FOR B.Sc. PHYSICS
CREDIT LEVEL - 5**

		PAPER TITLE	CREDITS	CREDIT POINTS	Hrs
Part I	First Language MIL - 4	Tamil / Malayalam / Hindi	3	15	6
Part II	Second Language CE - 4	English	3	15	6
Part III	Core Course – 10 CC - 10	Electricity & Magnetism	4	20	4
	Core Course – 11 CC- 11	Practical - IV Electricity & Magnetism	1	5	2
Total			11	55	18
Part IV	Minor Stream (Allied) MS - 4	Allied Chemistry - II	5	25	6

Part V	Skill Enhancement Courses SEC - 2	Electrical Technology	1	5	2
Part VI	Value Added Courses VAC - 2	Digital Empowerment Through Artificial Intelligence, Multimedia and Cyber Security	1	5	2
Part VII	Multidisciplinary NME - 1	Physics For Everyday Life	2	10	2
Part VIII	Internship		1	5	0
	Extension Activity (NSS / NCC / Physical Education)				
Total			21	105	30

**V SEMESTER
CREDIT DISTRIBUTION FOR B.Sc. PHYSICS
CREDIT LEVEL - 5.5**

		PAPER TITLE	CREDIT	CREDIT POINTS	Hrs
Part III	Core Course - 12 CC - 12	Basic Electronics	5	27.5	6
	Core Course - 13 CC- 13	Project	5	27.5	6
	Core Course -14 CC- 14	Practical - V Non Electronics - I	1	5.5	2
	Core Course -15 CC- 15	Practical - VI Electronics - I	1	5.5	2
	Core Courses Elective - 1 CCE -1	Computer Programming in C++	5	27.5	6
	Core Courses Elective - 2 CCE -2	Practical - VII Computer Programming in C++	1	5.5	2
Part V	Skill Enhancement Courses SEC - 3	Fundamentals of IoT	1	5.5	2
Part VI	Value Added Courses VAC - 3	Indian Knowledge System & Human Rights	1	5.5	2
Part VII	Multidisciplinary NME - 2	Renewable Energy	2	11	2
Total			22	121	30

**VI SEMESTER
CREDIT DISTRIBUTION FOR B.Sc. PHYSICS
CREDIT LEVEL – 5.5**

		PAPER TITLE	CREDITS	CREDIT UNITS	Hr
Part III	Core Course – 16 CC – 16	Digital Electronics	5	27.5	6
	Core Course – 17 CC- 17	Solid State Physics	5	27.5	6
	Core Course –18 CC- 18	Practical - VIII Non Electronics - II	1	5.5	2
	Core Course –19 CC- 19	Practical - IX Electronics - II	1	5.5	2
	Core Courses Elective - 3 CCE – 3	Computer programming in JAVA	5	27.5	6
Core Courses Elective - 4 CCE - 4	Practical - X Computer programming in JAVA	1	5.5	2	
Total			18	99	24
Part V	Skill Enhancement Courses SEC - 4	Embedded System	1	5.5	2
Part VI	Value Added Courses VAC - 4	Environmental Science	1	5.5	2
Part VII	Multidisciplinary NME - 3	Principles of Home Appliances	2	11	2
Total			22	121	30

SEMESTER - I

Course Title:	Modern Indian Language - 1	Course Type: Theory
		Course Code: 23LT11
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr. D. Deva Sambath	Dr. S. Sujana Bai	Dr. J. Kingsly
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % PED WITH CLO	CLO & MAPPED TH GA	Cognitive level CL	Knowledge Category KC
CLO-1	பாரதியார் காலந்தொட்டு தற்காலப் புதுக்கவிதைகள் வரை கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் கவியாக்கத் திறன்	1(8), 2(8), 6(4)	1, 2, 3,	Ap	P
CLO-2	புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்.	1(6), 2(8), 3(6)	1, 2, 3, 8	U	F
CLO-3	இக்கால இலக்கிய வகையினைக் கற்பதன் மூலம் படைப்பாக்கத் திறன் பெறுவர்.	1(8), 7(12)	2, 3, 7	An	M
CLO-4	மொழியறிவோடு சிந்தனைத் திறன் அறிவில் மேம்படுவர்.	1(10), 2(10)	2, 3	Ev	C
CLO-5	தமிழ்மொழியைப் பிழையின்றி எழுதவும் புதிய கலைச் சொற்களை உருவாக்கவும் அறிந்து கொள்வர்.	1(8), 3(6), 6(6)	2, 3, 8	C	P

Module	Course Description	Hours	% CLO Mapping with Module Learning Activities	Assessment Tasks	Ref.
I	மரபுக்கவிதை				
1.1	தமிழ்த் தெய்வ வணக்கம் - மனோன்மணியம் பெ. சுந்தரனார்	2	1(11)	GT	HrA 1
1.2	சிறுத்தையே வெளியில் வா- பாரதிதாசன்	2	1(12)	Sem	CT 1
1.3	புத்தரும் சிறுவனும்- கவிமணி தேசிக விநாயகம் பிள்ளை	4	1(22)	GD	CT 1
1.4	மொழி உணர்ச்சி -முடியரசன்	2	1(11)	Lec	CA 1
1.5	ஆட்டனத்தி ஆதிமந்தி -ஆதிமந்தி புலம்பல் - கண்ணதாசன்	4	1(22)	Lec	HoA 1
1.6	வினாத்தாள் -சுரதா	2	1(11)	SI	ST 1
1.7	கடல் - தமிழ் ஒளி	2	1(11)	ESS	SA 1
II	புதுக்கவிதை				
2.1	வீட்டுக்கொரு மரம் வளர்ப்போம் - அப்துல் ரகுமான்	2	2(11)	Sem	HoA 1
2.2	சென்றியூ கவிதைகள் -ஈரோடு தமிழன்பன் (ஏதேனும் ஐந்து கவிதைகள்)	2	2(11)	Lec	Qui 1
2.3	பிற்சேர்க்கை -வைரமுத்து	3	2(17)	Lec	CA 1
2.4	வாழைமரம் - மு. மேத்தா	2	2(11)	GD	CT 1
2.5	வள்ளுவம்பத்து- அறிவுமதி	2	2(11)	Lec	CT 1
2.6	ஆனந்தயழை மீட்டுகிறாய் - நா. முத்துக்குமார்	3	2(17)	OO	ST 1
2.7	சபிக்கப்பட்ட முத்தம்- சுகிர்தராணி	2	2(11)	Sem	SA 1
2.8	நீ எழுத மறுக்கும் எனது அழகு -இளம்பிறை	2	2(11)	Sem	HoA 1
2.9	வீட்டுக்கொரு மரம் வளர்ப்போம் - அப்துல் ரகுமான்	2	2(11)	Sem	HoA 1
2.10	சென்றியூ கவிதைகள் -ஈரோடு தமிழன்பன் (ஏதேனும் ஐந்து கவிதைகள்)	2	2(11)	Lec	Qui 1
III	சிறுகதைகள்				
3.1	வாய்ச்சொற்கள்- ஜெயகாந்தன்	2	3(11)	Lec	HoA 9

3.2	கடிதம் -புதுமைப்பித்தன்	1	3(6)	Lec	CT	10
3.3	கரு- உமா மகேஸ்வரி	2	3(11)	GD	HrA	9
3.4	முள்முடி தி. -ஜானகிராமன்	2	3(11)	Sem	CT	9
3.5	சிதறல்கள்- விழி.பா. இதயவேந்தன்	2	3(11)	Lec	SA	10
3.6	காகித உறவு - சு. சமுத்திரம்	3	3(17)	Lec	ST	10
3.7	வீட்டின் மூலையில் ஒரு சமையலறை- அம்பை	4	3(22)	GD	Ess	9
3.8	நாயக்காரர் சீமாட்டி -ஆண்டன் செக்காவ்	2	3(11)	Lec	SA	4
IV	இலக்கிய வரலாறு					
4.1	மரபுக்கவிதை	6	4(33)	Lec	MC	3
4.2	புதுக்கவிதை	6	4(33)	Lec	SA	3
4.3	சிறுகதை	6	4(34)	Sem	Ess	3
V	மொழித்திறன் போட்டித்தேர்வு					
5.1	பொருள் பொதிந்த சொற்றொடர்	3	5(16)	RF	Qui	6
5.2	ஒளிமுத்து ஒரு மொழி	3	5(16)	Sem	MC	6
5.3	வேற்றுமை உருபுகள்	3	5(17)	Lec	Ess	4
5.4	திணைஓ பால்ஓ எண்ஓ இடம்	3	5(17)	Lec	MC	5
5.5	கலைச்சொல்லாக்கம்	3	5(17)	RF	CA	6
5.6	மொழிபெயர்ப்பு	3	5(17)	Ess	CA	8

BOOKS FOR REFERENCE:

1. பொதுத்தமிழ் -முதற்பருவம், தமிழ்த்துறை வெளியீடு, ஸ்காட் கிறிஸ்தவக் கல்லூரி (தன்னாட்சி), நாகர்கோவில்.
2. தமிழ் இலக்கிய வரலாறு சிற்பி. பாலசுப்பிரமணியன், கவிதா பதிப்பகம், சென்னை
3. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல், மீனாட்சி புத்தக நிலையம், மதுரை.
4. ஆண்டன் செகாவ் கதைகள் எம். கோபாலகிருஷ்ணன், நூல்வனம் பதிப்பகம், சென்னை.
5. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு முனைவர் பாக்யமேரி, நியூசெஞ்சுரி புகர்வுஸ் (பி) லிட், சென்னை.
6. நன்னூல் - சொல்லதிகாரம், மணிவாசகர் பதிப்பகம், சென்னை
7. தொல்காப்பியம் - சொல்லதிகாரம், சாரதா பதிப்பகம், சென்னை
8. அடிப்படைத் தமிழ் இலக்கணம் -எம்.ஏ.நு.:மான், அடையாளம் பதிப்பகம், புத்தாந்தம்
9. 100 சிறந்த சிறுகதைகள் பாகம் (1) எஸ். ராமகிருஷ்ணன், தேசாந்திரி பதிப்பகம், சென்னை.
10. 100 சிறந்த சிறுகதைகள் எஸ். ராமகிருஷ்ணன், தேசாந்திரி பதிப்பகம், சென்னை பாகம்(2).

Course Title: Modern Indian Language - 1 Malayalam	Course Type: Theory	
		Course Code: 23LM11
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr.Jisha.S.K	Dr.Pramod Kumar D.N	Dr.R.Sreejasankar
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % APPED TH CLO	CLO & PLO PPED TH GA	Cognit Level CL	Knowle dge gory KC
CLO-1	understand the word level and sentence level translation and obtain the proverb narrative techniques	1(10), 2(10)	1, 8	U	M, C
CLO-2	evaluate the Malayalam Novel of different eras and getting life awareness and obtain the riddle's moral value	2(5), 3(10), 5(5)	1, 2, 3, 5, 8	U, An	M,F
CLO-3	analyse the Malayalam Short story of different eras and getting life awareness and obtain the riddle's moral value	2(5), 9(10), 10(5)	6, 7	An, E	M,P
CLO-4	evaluate the Malayalam autobiography of different eras and getting life awareness	9(10), 10(10)	1, 3, 7	An, E	M,F, C
CLO-5	evaluate the Malayalam Travelogue. of different eras and getting life awareness and obtain the moral value	1(10), 5(5), 9(5)	1, 2	U, E	M, C, P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activitie	Assessment Tasks	Ref.
I	Vivarthanam					
1.1	Malayala Vivarthana Charithram	1	1[10]	Lec	CA	14
1.2	Vivarthanathinte Prayojanam	1	1[15]	Lec	CA	14

1.3	Vivarthakanate Gunangal	1	1[12]	Lec	HrA	14
1.4	Vivarthanathinte Parimithikal	1	1[13]	Lec	CT	14
1.5	Englishil Ninnum Malayalathilekku rthanam Cheyyuka	4	1[12]	Lec	ST	14
1.6	Malayalathil NinnumEnglishilekku	4	1[13]	Lec	CT	14
1.7	Sailikalum Pazhanchollukalum	3	1[12]	Lec	ST	14
	Aasayavipulanam	3	1[13]	Lec	CT	14
II	Malayalanovel					
2.1	Malayalanovel Charithram	2	2[10]	Lec	OT	1,4,6,7,8,13
2.2	M.D.yude Novalukal	1	2[10]	Lec	OBT	1,4,6,7,8,13
2.3	Naalukettu Samagra avalokanam ada PadanamAadyathe 5	3	2[20]	Lec	Qui	1,4,6,7,8,13
2.4	Adyayam 1	3	2[10]	Lec	HoA	1,4,6,7,8,13
2.5	Adyayam 2	3	2[20]	Lec	MCQ	1,4,6,7,8,13
2.6	Adyayam 3	3	2[10]	Lec	Qui	1,4,6,7,8,13
2.7	Adyayam 4	3	2[20]	Lec	HoA	1,4,6,7,8,13
III	Malayala Cherukadha					
3.1	Malayala Cherukadha Charithram	3	3[20]	GD	SA	1,2,3,5,10,11
3.2	Karoorinte Cherukadhakal	3	3[10]	CS	ESS	1,2,3,5,10,11
3.3	Marappavakal- Kaaroor	3	3[20]	Lec	CA	1,2,3,5,10,11
3.4	Uthuppante Kinar - Kaaroor	3	3[10]	Lec	HrA	1,2,3,5,10,11
3.5	Kalchakaram - Kaaroor	3	3[20]	Lec	CT	1,2,3,5,10,11
3.6	Poovamabhazham - Kaaroor	3	3[20]	Lec	CT	1,2,3,5,10,11
IV	Athmakadha Saahithyam					
4.1	Malayala AthmakadhaSaahithvaCharithram	3	4[20]	Sem	ST	1,12
4.2	Joseph Mundasseri	3	4[20]	Sem	OT	1,12

4.3	Kozhinja Elakal Samagra okanam (Visada Padanam Aadya	3	4[20]	CS	OBT	1,12
4.4	Adyayam 1	3	4[10]	Lec	Qui	1,12
4.5	Adyayam 2	3	4[20]	Lec	HoA	1,12
4.6	Adyayam 3	3	4[10]	Lec	Qui	1,12
V	Yaathravivaranam					
5.1	Malayala Yaathra vivarana	3	5[20]	Ess	MCQ	1
5.2	Raajan Kaakkanadan	3	5[10]	GD	SA	1
5.3	Himavante Mukal Thattil - Raajan kkanadan Samagra avalokanam	3	5[20]	SP	CA	1
5.4	Adyayam 1	3	5[10]	SP	HrA	1
5.5	Adyayam 2	3	5[20]	GL	CT	1
5.6	Adyayam 3	3	5[20]	GL	CT	1

BOOKS FOR REFERENCE:

1. K.M.George, Aadgunika Malayala Sahithya Charithram Prasthanangalilude, Kottayam, D.C.Books, 1998.
2. M.Achuthan, Cherukadha Innale Innu, D.C Books,2007
3. N.Prabhakaran, Kadha Thedunna Kadha,
4. Tharakan K.M. Malayala Novel Saahithya Charithram, Karala Saahithya Accademy Thichur, D.C.Books,1978
5. K.S.Ravikumar, Kadhayum Kalavum,
6. E. V. Ramkrishnan ,Malayala Novalinte Desakaalangaal, Mathrbhoomi Books,2017.
7. K.P. Appan, Maranunna Malayala Noval, , D.C Books, 2015
8. P.K.Rajasekharan , Andhanaya Daivam, D.C Books,,1970
9. Dr.K.M. Prabhakara Varir , Shylee shilppam,
10. Kaaroor Neelakanda Pillai,Kaaroor Kadhakal Sampoomnam, NBS Kottayam 2004,
11. Karur Kadha patanam- M.M.Basheer,NBS Kottayam, 1980
12. Gopalakrishnan Naduvattom, Aathmakadhasaahithyam Saahithyam, Kerala Bhasha Institute,
13. Thiruvananthapuram, 1990
14. Tharakan K.M., Aadhunika Novel Dersanangaal, N.B.S. Kottayam, 1980.
15. Dr. N.E.Viswanadhan, Vivarthana Vicharam, D.C Books, 2004

Course Title:	Modern Indian Language - 1 Hindi	Course Type: Theory
Course Code: 23LH11		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % PED WITH CLO	CLO & MAPPED TH GA	Cognitive level CL	Knowledge ogory KC
CLO-1	Understand the concepts of Hindi sounds	1(10), 2(15)	1, 8	U	M,F,C
CLO-2	<ul style="list-style-type: none"> Understand and analyze Sentence formation in Hindi 	2(10), 3(15), 5(10)	1,2, 3, 5	U,An	M,C
CLO-3	Remember Hindi vocabulary	2(10), 9(10), 10(15)	1, 3, 7, 8,	An, E	M,C,P
CLO-4	Understand and analyze stories and other passages	9(10), 10(20)	3, 7, 9	An, E	M,C,P
CLO-5	Evaluate Language ability	1(10), 5(10), 9(5)	1, 6,	U, E	M,C,P

Module	Course Description	Hours	% CLO mapping with Module	Learning ities	Assessment Tasks	Ref.
I	Buniyadi Hindi					
1.1	Swar	3	1[10]	Lec	CA	2,3,4,5,6,8
1.2	Vyanjan	4	1[15]	Lec	CA	2,3,4,5,6,8
1.3	BarahKhadi	3	1[25]	Lec	HrA	2,3,4,5,6,8

1.4	Shabdh	2	1[25]	Lec	CT	2,3,4,5,6,8
1.5	Vakayarachana	3	1[25]	Lec	ST	1
II	Hindi shabdhavali					
2.1	Risthom ke naam	3	2[50]	Lec	OT	2,3,4,5,6,8
2.2	Gharelu Padharthom ke naam	3	2[50]	Lec	OB	2,3,4,5,6,8
III	Vyakaran					
3.1	Sadharan vakya our sangya	3	3[25]	GD	SA	2,3,4,5,6,8
3.2	Sarvanaam	3	3[25]	CS	ESS	2,3,4,5,6,8
3.3	Visheshan	3	3[25]	Lec	CA	2,3,4,5,6,8
3.4	Kriya aadi shabdhom ka prayog	3	3[25]	Lec	HrA	2,3,4,5,6,8
IV	Chote Gadhyamsh ke patan					
4.1	Bachom ki kahaniyam	3	3[50]	Lec	CT	7
4.2	Pathr pathrkaom mem Prakashith Gadyamsh ka patan	3	4[50]	Sem	OT	2,3,4,5,6,8
V	Nibandh					
5.1	Sant. Thiruvalluvar	3	5[25]	Ess	MC	9
5.2	EVR Thandai Periyar	3	5[25]	GD	SA	9
5.3	Naari Saktheekaran	3	5[25]	SP	CA	9
5.4	Paravaran Samrakshan	3	5[25]	SP	HrA	9

BOOKS FOR REFERENCE:

1. 1 Hindi ke avyay vakyamsh – Chaturbuj Sahay
2. Subodh Hindi vyakaran – Phoochand Jain
3. Sanshipt Hindi Vyakaran – Vyavaharic Hindi – Nagappa
4. Abhinav Hindi vyakaran – Nagappa
5. Saral Hindi Vyakaran – Syamachandra Kapur
6. Vyakaran Pradeep – Ramdev
7. Lakhu Balkadhayem – Ramashankar
8. Hindi Grammar – Edwin Greeves
9. Hindi Nibandh

Course Title:	Communicative English - 1	Course Type: Theory
Course Code: 23LE11		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr. V Brinsley	Dr. L. Judith Sophia	Dr. Sheni D. L. Singh
Ass. Prof. of English	Asso. Prof. of English	Ass. Prof. of English
+918903480894	+919486459061	+919487386706
vbrinsley@gmail.com	judithsophia24@gmail.com	shenisingh1984@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % APPED TH CLO	CLO & LO PPED	Cogni Level CL	Knowle dge Category
CLO-1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	1 (10) 6 (7) 7 (3)	2, 3	U AP	F P
CLO-2	Examine and present material of the prescribed texts and other texts	2 (8) 5 (12)	1, 2	U, n E	C M
CLO-3	Identify cross cutting issues like, Human values, (Professional, Personal and Domestic) ethics and environmental sustainability and practise them	3 (8) 8 (6) 9 (6)	1, 4, 8, 9	An E, Ap	C P
CLO-4	Present and differentiate various cultures and civilizations of the Globe and distinguish Indian traditional Knowledge	1 (10) 8 (5) 10 (5)	5, 6, 10	U, Ap	P M
CLO-5	Relate the textual content and underlying meaning of the context to the real life situations	5 (6) 8 (8) 10 (6)	1, 2, 5, 7	E, Ap, C	C M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	PROSE					
1.1	JRD - Harish Bhat					

1.1.1	Introduction to the Author, essay &	3	2 [4], 4 [4]	L	Ho A	1
1.1.2	Textual analysis	1	2 [4], 3 [5], 5 [5]	L GD	SA	1
1.1.3	Human values to be imbibed from the life of Tata	2	2 [4], 3 [5],	L GD	Ess	1
1.2	Us and Them - David Sedaris					
1.2.1	Introduction to the Author, essay & Textual Analysis	3	2 [4], 4 [8]	L	Ho A	2
1.2.2	Thematic discussion: Self-centred attitude & Social media influence	2	2 [4], 3 [5]	L GD	MCQ HoA	2
1.2.3	Human Values (Empathy) reflected in "Us and Them"	1	2 [4], [4],	L GD	SA Ess	2
1.3	Uncle Podger Hangs a Picture - Jerome K Jerome					
1.3.1	Introduction to the Author & essay Textual Analysis	3	2 [4], 4 [6]	L	Ho A	3
1.3.2	Thematic Discussion: Comic attitude of Patriarchal Dominance in the domestic	2	2 [4], 3 [5],	L GD	Ess HoA	3
1.3.3	Uncle Podger- Character analysis	1	5 [6]	RP	MCQ	3
II	POETRY					
2.1	A Patch of Land - Subramania Bharati					
2.1.1	Introduction to the poet and the poem	1	2 [2], 4 [8]	L	Ho A	4
2.1.2	Poetry Analysis- Discussion on themes & Techniques	2	2 [3], 5 [5]	L GD	Hr A	4
2.1.3	Connection between Land and Poetic creation: A Reflection on Indian	1	4 [6]	GD	Ess	
2.2	The Sparrow - Paul Laurence Dunbar					
2.2.1	Introduction to the poet and the poem	1	2 [3], 4 [4]	L	Ho A	5
2.2.3	Poetry Analysis- Discussion on themes and Techniques	3	2 [4], 5 [3]	GD	Hr A	5
2.2.4	Human - Environment Interaction and Sustainability implied in "The Sparrow"	1	2 [4], [5], 5 [5]	L GD	Essay	5
2.3	A Nation's Strength - Ralph Waldo Emerson					
2.3.1	Introduction to the poet and the poem	1	2 [4], 4 [4],	L	Ho A	6
2.3.2	Poetry Analysis- Discussion on themes - Nation building & Techniques	3	2 [4], 4 [4]	L GD	Ho A	6

2.3.3	Democratic values and Universalism in "A Nation's Strength"	1	4 [4] 5 [3]	PT	MCQ	6
2.4	Love Cycle - Chinua Achebe					
2.4.1	Introduction to the Poet and the poem	1	2 [4], 4 [4]	L, CCC	Ho A	7
2.4.2	Poetry Analysis- Discussion on themes - Connection between Land/Nature and human life and human values	2	2 [4], 3 [4], 5 [5]	PT GD	Ho A	7
2.4.3	Analysis of Techniques & Poetic devices in "Love Cycle"	1	2 [4]	PT	MCQ	7
III	SHORT STORIES					
3.1	The Faltering Pendulum- Bhabani					
3.1.1	Introduction to the author and the short story	1	2 [4], 4 [8]	L	Ho A	8
3.1.2	Plot & Character Analysis	3	2 [4], 5 [3]	TPS GD	Hr A Ho A	8
3.1.3	Nature- Human Interaction and Human rights in "Faltering Pendulum"	2	2 [4], 3 [5], [5]	L GD	Hr A	8
3.2	How I Taught my Grandmother to Read- Sudha Murthy					
3.2.1	Introduction to the author and the short story	1	2 [4], 4 [8]	L, GD	Ho A	9
3.2.2	Plot & Character Analysis	3	2 [4], 5 [5]	CCC	Hr A CT	9
3.2.3	Thematic discussion: Lifelong learning & Human value of perseverance	2	2 [4], 3 10],	L, GD	Ho A, CT	9
3.3	The Gold Frame- R.K. Laxman					
3.3.1	Introduction to the author and the short story	1	2 [4], 4 [4]	L	Ho A, CT	10
3.3.2	Plot & Character Analysis	3	2 [4], 5 [3]	L, CCC	Ho A, CT	10
3.3.3	Themes & Techniques	2	2 [4], 5 [3]	PT, GD	Hr A	10
IV	LANGUAGE COMPETENCY					
4.1	Vocabulary: Synonyms, Antonyms & Word Formation	5	1 [32]	CCC	Hr A	11, 12
4.2	Appropriate use of Articles	2	1 [24]	CCC	Hr A	11, 12

4.3	Parts of Speech	7	1[24]	CCC	Hr A	11, 12
4.4	Error correction	4	1[20]	CCC	Hr A	11, 12
V	ENGLISH FOR WORKPLACE					
5.1	Self - introduction, Greetings	5	1[28]	GT, GD	Viva	13
5.2	Introducing others	4	1[20]	GT, GD	Viva	13
5.3	Listening for General and Specific Information	5	1[24]	GD	Viva	13
5.4	Listening to and Giving Instructions / Directions	4	1[28]	GD	Viva	13

BOOKS FOR REFERENCE:

1. <https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories>
2. <https://legacy.npr.org/programs/morning/features/2004/jun/sedaris/usandthem.html>
3. <http://rosyhunt.blogspot.com/2013/01/uncle-Podger-hangs-picture.html>
4. https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
5. <https://poets.org/poem/sparrow-0>
6. <https://poets.org/poem/nations-strength>
7. <https://www.best-poems.net/chinua-achebe/love-cycle.html>
8. *Steel Hawk and Other Stories* by Bhattacharya, Bhabani, New Delhi: Sahitya Akademi, 1967
9. *How I Taught my Grandmother to Read and Other Stories*, Murthy, Sudha, Penguin Books, India, 2004
10. <https://fybaenglish.blogspot.com/2018/12/the-gold-frame-r-k-laxman.html>
11. *English in Use - A Textbook for College Students* (English, Paperback, - T.Vijay Kumar, K Durga Bhavani, YL Srinivas)
12. *Practical English Usage* - 4th Edition By Michael Swan
13. *The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace* -Margaret Shepherd, Penny Carter, (Illustrator), Sharon Hogan, 20

Course Title:	PROPERTIES OF MATTER AND SOUND		Course Type: Theory
Course Code: 23GP11			
Total Hours: 60	Hours/Week: 4	Credits: 4	
Pass-Out Policy: Minimum Contact Hours: 36 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Hepzy Roy	Dr. V. Anslin Ferby	Dr. H. Adlin Mahiba	
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achroy66@gmail.com	anslinv@gmail.com	adlinmahiba1@gmail.com	

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % PED WITH CLO	CLO & MAPPED TH GA	Cognitive level CL	Knowledge Category KC
CLO-1	Relate elastic behaviour in terms of three moduli of elasticity and working of torsion pendulum.	1[10] 2[5] 5[5]	1, 2, 3, 10	R, U	F, C
CLO-2	Able to appreciate concept of bending of beams, analyse the expression, quantify and understand nature of materials.	1[10] 2[5] 5[5]	1, 2, 3, 10	U	P, M
CLO-3	Surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many problems.	1[10] 2[5] 5[5]	1, 2, 3, 10	Ap, An	F, M
CLO-4	Analyse simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Evaluate frequency of ac mains experimentally.	1[10] 2[5] 5[5]	1, 2, 3, 10	An, E	F, P
CLO-5	Understand the concept of acoustics, importance of constructing buildings with good acoustics and apply in real life, medical field and assimilate different methods of production of ultrasonic waves	1[10] 2[5] 5[5]	1, 2, 3, 7	U, Ap	P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	ELASTICITY					
1.1	Hooke's law	1	1[5]	Lec	Qui	2
1.2	Stress-strain diagram	1	1[10]	GD	Ass	2

1.3	Elastic constants	1	1[15]	Lec	MCQ	2
1.4	Poisson's ratio	1	1[5]	Lec	Qui	2
1.5	Relation between Elastic constants and Poisson's ratio	1	1[15]	Lec	Ass	2
1.6	Work done in stretching and twisting a	1	1[10]	Lec	SA	2
1.7	Twisting couple of a cylinder	2	1[15]	Lec	SA	2
1.8	Rigidity modulus by static torsion	2	1[10]	Lec	Ess	2
1.9	Torsion pendulum-without mass	1	1[10]	EL	Ess	2
1.10	Torsion pendulum-with mass	1	1[5]	EL	Ess	2
II	BENDING OF BEAMS					
2.1	Introduction-BEAMS	1	2[5]	Lec	MCQ	2
2.2	Cantilever	1	2[5]	EL	Qui	2
2.3	Expression for bending moment	1	2[1]	Lec	SA	2
2.4	Expression for depression at the loaded end of the Cantilever	1	2[2]	EL	Ess	2
2.5	Oscillations of a Cantilever	1	2[1]	Lec	Ass	2
2.6	Expression for time period	1	2[1]	GD	Ass	2
2.7	Experiment to find Young's modulus-Non uniform bending	1	2[1]	EL	Ess	2
2.8	Experiment to find Young's modulus by Koenig's method	2	2[1]	Lec	Ess	2
2.9	Uniform bending - Expression for	2	2[1]	EL	Ass	2
2.10	Experiment to determine Young's modulus using microscope	1	2[1]	EL	Ess	2
III	FLUID DYNAMIC					
3.1	<i>Surface tension</i> : definition, molecular forces	1	3[10]	Lec	Qui	1
3.2	Excess pressure over curved surface	1	3[10]	Lec	Ess	1
3.3	Application to spherical and cylindrical drops and bubbles	1	3[5]	GD	Ass	1
3.4	Determination of surface tension by Drop Weight method	2	3[10]	Lec	Ess	1
3.5	Variation of surface tension with temperature	1	3[10]	GD	SA	1
3.6	<i>Viscosity</i> : Definition, Streamline and turbulent flow,	1	3[10]	Lec	MCQ	1
3.7	Rate of flow of liquid in a capillary tube	1	3[10]	Lec	Qui	1
3.8	Poiseuille's formula	1	3[10]	Lec	Ess	1
3.9	Terminal velocity	1	3[5]	GD	SA	1

3.10	Determination of coefficient of viscosity by Stoke's method	1	3[10]	EL	MCQ	1
3.11	Variation of viscosity with temperature	1	3[10]	EL	Ess	1
IV	WAVES AND OSCILLATIONS					
4.1	Simple Harmonic Motion (SHM), Differential equation of SHM, Graphical representation of SHM	1	4[1]	Lec	Ass	8
4.2	Composition of two SHM in a straight line	2	4[1]	Lec	Ess	8
4.3	Composition of two SHM in a at right angles	2	4[1]	GD	Ess	8
4.4	Lissajous's figures,	1	4[1]	Lec	SA	8
4.5	Free vibrations	1	4[1]	Lec	Ess	8
4.6	Damped vibrations	1	4[1]	Lec	Ess	8
4.7	Forced vibrations	1	4[1]	Lec	Ess	8
4.8	Resonance and Sharpness of resonance	1	4[5]	GD	MCQ	8
4.9	Laws of transverse vibration in strings	1	4[1]	GD	SA	8
4.10	Determination of frequency using Melde's string apparatus	1	4[1]	EL	Ess	8
V	ACOUSTICS OF BUILDINGS AND ULTRASONICS					
5.1	Intensity of sound	1	5[5]	Lec	SA	4
5.2	Decibel	1	5[5]	Lec	Ass	4
5.3	Loudness of sound	1	5[5]	Lec	Ass	4
5.4	Reverberation	1	5[5]	Lec	Qui	4
5.5	Sabine's reverberation formula	2	5[2]	Lec	Ess	4
5.6	Acoustic intensity	1	5[5]	GD	MCQ	4
5.7	Factors affecting the acoustics of buildings	1	5[1]	GD	Ess	4
5.8	<i>Ultrasonic waves</i> : production of ultrasonic waves – Piezoelectric crystal method	2	5[2]	Lec	Ess	4
5.9	Magnetostriction Method	1	5[1]	Lec	Ess	4
5.10	Application of ultrasonic waves	1	5[1]	GD	Qui	4

BOOKS FOR REFERENCE:

1. D.S. Mathur, 2010, Elements of Properties of Matter, S. Chand & Co.
2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S. Chand & Co
3. D.R. Khanna & R.S. Bedi, 1969, Textbook of Sound, AtmaRam & sons

4. BrijLal and N. Subrahmanyam, 1995, A Text Book of Sound, Second revised edition, Vikas Publishing House.
5. R. Murugesan, 2012, Properties of Matter, S. Chand & Co.
6. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers
7. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, R. Chand & Co.
8. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann, India.

Course Title:	ATOMIC PHYSICS		Course Type: Theory
			Course Code: 23GP12
Total Hours: 60	Hours/Week: 4	Credits: 4	
Pass-Out Policy : Minimum Contact Hours: 36 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Hepzy Roy	Dr. Y. Sheeba Sherlin	Dr.T.R. Beena	
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CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % PED WITH CLO	CLO & PLO PED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand physics of atoms and molecules related to positive rays.	1[10] 2[5] 3[5]	1,2,3,8	U	F, C
CLO-2	Develop basic understanding about the basic structure of atom.	1[10] 2[5] 3[5]	1,2,3,8	U	C, M
CLO-3	Remember various atomic models, their properties and the effect of atoms in magnetic and electric fields.	1[10] 2[5] 3[5]	1,2,3,8	R	F, M
CLO-4	Analyse and apply Characteristic X-ray spectrum	1[10] 2[5] 3[5]	1,2,3,8	An	P, M
CLO-5	Create an idea about Photoelectric effect and Planks quntum theory	1[10] 2[5] 3[5]	1,2,3,8	C	P, M

Module	Course Description	Hours	% CLO Mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	POSITIVE RAYS					
1.1	Discovery of positive rays	0.5	1[5]	Lec	Qui	1
1.2	Properties of positive rays	1	1[5]	GD	SA	1
1.3	Thomson's parabola method of positive ray analysis	1	1[10]	Lec	Ess	1
1.4	Action of combined electric and magnetic fields - Determination of e/m	1	1[10]	Lec	Ess	1
1.5	Limitations of parabola method	0.5	1[10]	Lec	Qui	1
1.6	Aston's Mass Spectrograph-theory	2	1[10]	Lec	Ess	1
1.7	Bainbridge's Mass Spectrograph	1	1[10]	Lec	Ess	1
1.8	Dempster's Mass Spectrograph	1	1[10]	Lec	Ess	1
1.9	Mass defect – Packing fraction – Binding	1	1[10]	PT	Pro	1
1.10	Separation of isotopes – Mass spectrograph method and Diffusion method	1	1[10]	Lec	SA	1
1.11	Thermal diffusion method and pressure diffusion method	1	1[10]	Lec	SA	1
II	STRUCTURE OF THE ATOM					
2.1	Introduction to the Structure of the atom	1	2[5]	BS	Qui	1
2.2	Rutherford's experiment and the nuclear atom model	1	2[10]	GD	Ess	1
2.3	Bohr atom model and Bohr formulae	1.5	2[10]	Lec	Ess	1
2.4	Bohr's interpretation of hydrogen spectrum	1	2[10]	Lec	SA	1
2.5	Methods of excitation of atoms	1	2[10]	Lec	SA	1
2.6	Critical potentials	1	2[10]	Lec	SA	1
2.7	Experimental determination of critical potentials – Franck and Hertz method	1	2[10]	Lec	Ess	1
2.8	Draw backs of Bohr's atom model	0.5	2[5]	GD	Qui	1
2.9	Davis and Goucher's method	1	2[10]	Lec	Ess	1

2.10	Sommerfeld's relativistic atom model	1	2[10]	Lec	SA	1
2.11	Fine structure of $H\alpha$ line	1	2[10]	Lec	SA	1
III	THE VECTOR ATOM MODEL					
3.1	Spatial quantisation – Spinning electron	1	3[10]	Lec	SA	1
3.2	Quantum numbers associated with the	1	3[10]	GD	Ess	1
3.3	Coupling schemes	1	3[10]	Lec	SA	1
3.4	Pauli's exclusion principle and its application	1	3[10]	OO	Ess	1
3.5	Magnetic dipole moment due to orbital motion of the electron	1	3[10]	Lec	Ess	1
3.6	Magnetic dipole moment due to spin	1	3[5]	GD	Qui	1
3.7	The Stern and Gerlach experiment	1	3[10]	Lec	Ess	1
3.8	Zeeman effect – Experimental arrangement for the normal Zeeman	1	3[10]	Lec	Ess	1
3.9	Expression for Zeeman Shift	1	3[10]	Lec	Ess	1
3.10	Larmor's theorem	1	3[10]	Lec	SA	1
3.11	Anomalous Zeeman effect	1	3[10]	Lec	SA	1
3.12	Paschen – Back effect	1	3[5]	Lec	SA	1
3.13	Stark effect – Experimental study	1	3[10]	Lec	SA	1
IV	X- RAYS					
4.1	Production of X- rays – the Coolidge tube	1	4[10]	Lec	Ess	1
4.2	Absorption of X- rays	1	4[10]	Lec	SA	1
4.3	Bragg's law	1	4[10]	GD	SA	1
4.4	The Bragg's X-ray Spectrometer	1	4[10]	Lec	Ess	1
4.5	X-ray spectra and its main features	1	4[10]	Lec	SA	1
4.6	Duane – Hunt law and its explanation	1	4[10]	Lec	Ess	1

4.7	Characteristic X-ray spectrum	1	4[10]	PT	Ess	1
4.8	Auger effect - Auger electron	1	4[10]	Lec	SA	1
4.9	Satellites	1	4[10]	GD	SA	1
4.10	Crompton scattering	1	4[10]	Lec	SA	1
V	PHOTOELECTRIC EFFECT AND PLANKS QUANTUM THEORY					
5.1	Introduction - Photoelectric effect	1	5[5]	EL	Qui	1
5.2	Lenard's method to determine e/m for photoelectron	1	5[5]	Lec	Ess	1
5.3	Richardson and Crompton experiment-Relation between photoelectric current and retarding potential	2	5[10]	Lec	Ess	1
5.4	Relation between velocity of photoelectron and frequency of light	1	5[5]	GD	SA	1
5.5	Experimental verification on the photoelectric effect	1	5[10]	Lec	Ess	1
5.6	Laws of photo electric emission- Failure of electromagnetic theory, Quantum	1	5[5]	Lec	SA	1
5.7	Einstein's photo-electric equation	1	5[10]	Lec	SA	1
5.8	Experimental verification-Millikan's experiment	1	5[10]	Lec	Ess	1
5.9	Photoelectric cells- (i)photo-emissive cells	1	5[5]	PT	SA	1
5.10	(ii)photo-voltaic cells and (iii)photo-conductive cells	1	5[10]	Lec	SA	1
5.11	Application of Photoelectric cells	1	5[5]	GD	SA	1
5.12	Planck's quantum theory - Wein's displacement law	1	5[10]	Lec	SA	1
5.13	Planks hypothesis - Derivation of Planks law of radiation	2	5[10]	Lec	Ess	1

BOOKS FOR REFERENCE:

1. R. Murugesan, Modern Physics, S. Chand & Company Ltd., New Delhi, 1998.
2. N.K. Sehgal, K.L. Chopra and D.L. Sehgal, Modern Physics, Sultan Chand & Sons, New Delhi, 2004.
3. N. Subrahmanyam and Brijal, Atomic and Nuclear Physics, S. Chand & Company Ltd., New Delhi, 2006.

4. Arthur Beiser, Concepts of modern Physics, Vth Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1997.

Course Title: PROPERTIES OF MATTER & SOUND	Course Type: Practical	
Course Code: 23GPP1		
Total Hours: 60	Hours/Week: 4	Credits: 2
Pass-Out Policy : Minimum Contact Hours: 36 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. V. Anslin Ferby	Dr.T.R. Beena
Asso. Prof. & Faculty Head	Asso. Prof. of Physics	Ass. Prof. of Physics
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achroy66@gmail.com	anslinv@gmail.com	trbeena@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % PED WITH CLO	CLO & MAPPED TH GA	Cognitive level CL	Knowledge Category KC
CLO-1	Develop an understanding about the handling of various instruments.	2[10] 6[10]	1, 2, 3	An, E	P
CLO-2	Analytical attitude for physical laws through simple and basic experiments.	2[10] 6[10]	1, 2, 3	An, E	P
CLO-3	To demonstrate and verify phenomenon of optics using experimental methods	2[10] 6[10]	1, 2, 3	An, E	M
CLO-4	Study the elastic behaviour and working of compound and torsional pendulums	2[10] 6[10]	1, 2, 3	An, E	M
CLO-5	Matter can undergo observable changes that can be described and categorized	2[10] 6[10]	1, 2, 3	An, E	P

Course Description
*Vernier callipers and Screw gauge-thickness measurements
*Vernier microscope- radius of capillary tube
1.Young's modulus - Non-uniform bending - Pin & microscope
2.Young's modulus - Uniform bending - Optic lever and Telescope
3.Young's Modulus-cantilever depression
4.Compound Pendulum-g
5.Rigidity modulus - Torsional pendulum (with and without masses)

6.Rigidity modulus and moment of inertia - Torsional pendulum (With identical masses)
7.Rigidity modulus - Static torsion
8.Surface tension and interfacial surface tension –drop weight method
9.Surface tension-capillary rise method
10.Viscosity-Stokes method
11.Coefficient of viscosity of liquid - Graduated burette

*** Not for Examination Note: Use of digital balance and calculators are permitted**

Course Title: ALLIED PHYSICS – I	Course Type: Theory	
Course Code: 23AP01		
Total Hours: 60	Hours/Week: 4	Credits: 2
Pass-Out Policy : Minimum Contact Hours: 36 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. D.J. Jeejamol	Dr. H. Adlin Mahiba
Asso. Prof. & Faculty Head	Ass. Prof. of Physics	Ass. Prof. of Physics
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achroy66@gmail.com	lomajeej@gmail.com	adlinmahiba1@gmail.com

CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & MAPPED TH GA	Cognitive level CL	Knowled category KC
CLO- 1	Explain types of motion and extend their knowledge in the study of various dynamic motions by analyzing and demonstrating mathematically.	3[10] 5[10]	1,2,7, 8,10	R, Ap	F, C
CLO- 2	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life.	3[10] 5[10]	1,2,7, 8,10	U, An	C, M
CLO- 3	Comprehend basic concepts of thermodynamics, concept of entropy and associated theorems.	3[10] 5[10]	1,2,7, 8,10	An	F, M

CLO- 4	Articulate the knowledge about electric current, resistance, capacitance in terms of potential electric field and correlate the connection between electric field and magnetic field and analyze them mathematically.	3[10] 5[10]	1,2,7, 8,10	A, E	P, M
CLO- 5	Interpret the real-life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. Infer operations using Boolean algebra and acquire elementary idea.	3[10] 5[10]	1,2,7, 8,10	U, C	P, M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I WAVES, OSCILLATIONS AND ULTRASONICS						
1.1	Simple harmonic motion (SHM)	1	1[15]	Lec	SA	1, 2
1.2	Composition of two SHMs at right angles (periods in the ratio 1:1) - Lissajous figures - uses	2	1[10]	BS	Ess	1, 2
1.3	Laws of transverse vibrations of strings	1	1[10]	Lec	Ess	1, 2
1.4	Determination of AC frequency using sonometer (steel and brass wires)	1	1[10]	EL	Ess	1, 2
1.5	Ultrasound - Production - Piezoelectric method	1	1[15]	Lec	Ess	1, 3
1.6	Application of ultrasonics: Medical field - Lithotripsy	2	1[10]	GD	Ess	1, 3
1.7	- Ultrasonography, Ultrasonoimaging	1	1[10]	GD	Ess	1, 3
1.8	- Ultrasonics in Dentistry, Ultrasonics in Physiotherapy	2	1[10]	GD	Ess	1, 3
1.9	Ultrasonics in green Chemistry	1	1[10]	TPS	Sem	1, 3
II PROPERTIES OF MATTER						
2.1	Elasticity: Elastic constants	1	2[10]	Lec	MCQ	1, 4
2.2	Bending of beam	1	2[10]	Lec	Ess	1, 4
2.3	Determination of Young's modulus by non-uniform bending	1	2[10]	EL	Ess	1, 4
2.4	Energy stored in a stretched wire	1	2[5]	BS	SA	1, 4
2.5	Torsion of a wire - Determination of rigidity modulus by torsional pendulum	1	2[10]	EL	Ess	1, 4
2.6	Viscosity: Streamline and turbulent motion - Critical velocity	1	2[5]	Lec	Ess	1, 4
2.7	Coefficient of viscosity - Poiseuille's formula	1	2[10]	Lec	Ess	1, 4
2.8	Comparison of viscosities - Burette	1	2[10]	EL	Ess	1, 4

	method,					
2.9	Surface tension: Definition – Molecular theory	1	2[10]	Lec	SA	1, 4
2.10	Droplet's formation – COVID transmission through droplets, saliva	2	2[10]	Lec	Ess	1, 4
2.11	Drop weight method – Interfacial surface tension.	1	2[10]	EL	Ass	1, 4
III HEAT AND THERMODYNAMICS						
3.1	Joule-Kelvin effect – Joule-Thomson porous plug experiment	2	3[15]	Lec	Ess	1, 5
3.2	Theory of Joule-Thomson porous plug experiment – Temperature of inversion	2	3[10]	Lec	Ess	1, 5
3.3	Liquefaction of oxygen	1	3[10]	Lec	SA	1, 5
3.4	Linde's process of liquefaction of air	1	3[10]	Lec	Ess	1, 5
3.5	Liquid oxygen for medical purpose	1	3[10]	GD	Ess	1, 5
3.6	Laws of thermodynamics	1	3[15]	Lec	Ess	1, 5
3.7	Heat engine – Carnot's cycle – Efficiency	2	3[10]	Lec	Ess	1, 5
3.8	Entropy	1	3[10]	Lec	SA	1, 5
3.9	Change of entropy in reversible and irreversible process	1	3[10]	BS	Ass	1, 5
IV ELECTRICITY AND MAGNETISM						
4.1	Potentiometer – Principle	1	4[10]	Lec	Ess	1, 6
4.2	Measurement of thermo emf using potentiometer	1	4[10]	EL	Ess	1, 6
4.3	Magnetic field due to a current carrying conductor – Biot-Savart's law	2	4[10]	Lec	Ess	1, 6
4.4	Field along the axis of the coil carrying current	2	4[10]	Lec	Ess	1, 6
4.5	Peak, average and RMS values of AC	1	4[15]	BS	Ess	1, 6
4.6	Power factor and current values in an AC circuit	1	4[10]	BS	Ess	1, 6
4.7	Types of switches in household and factories– Smart wifi switches	2	4[15]	Lec	Ess	1, 6
4.8	Fuses in houses	1	4[10]	RP	Ass	1, 6
4.9	Circuit breakers in houses	1	4[10]	RP	Sem	1, 6
V DIGITAL ELECTRONICS AND DIGITAL INDIA						
5.1	Logic gates - OR, AND	1	5[10]	Lec	Ess	1, 7
5.2	Logic gates – NOT, NAND	1	5[10]	Lec	Ess	1, 7
5.3	Logic gates – NOR, EXOR	1	5[10]	Lec	Ess	1, 7
5.4	Universal building blocks	1	5[10]	BS	Ess	1, 7
5.5	Boolean algebra	1	5[10]	BS	Pro	1, 7
5.6	De Morgan's theorem – verification	1	5[10]	Lec	Ess	1, 7
5.7	Overview of Government initiatives: Software technological parks under MeitY, NIELIT	2	5[15]	GD	Ass	1, 8
5.8	Semiconductor Laboratories under Department of Space	2	5[10]	GD	Ess	1, 8
5.9	An introduction to Digital India	2	5[15]	GD	Sem	1, 8

BOOKS FOR REFERENCE:

1. R. Murugesan (2001), Allied Physics, S. Chand and Co, New Delhi.
2. Brijlal and N. Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi.
3. Dale Ensminger, Leonard J. Bond (2011), Ultrasonics - Fundamentals, Technologies, and Applications, 3rd Edition, CRC Press.
4. Brijlal and N. Subramaniam (1994), Properties of Matter, S. Chand and Co., New Delhi.
5. J.B. Rajam and C.L. Arora (1976), Heat and Thermodynamics (8th edition), S. Chand and Co., New Delhi.
6. N.S. Khare and S.S. Srivastava (1983), Electricity and Magnetism 10th Edn., Atma Ram and Sons, New Delhi.
7. V.K. Metha (2004). Principles of Electronics, 6th Edn. S. Chand and Company.
8. A. Subramaniam, Applied Electronics, 2nd Edn., National Publishing Co., Chennai.
9. Resnick Halliday and Walker (2018), Fundamentals of Physics b (11th edition), John Wiley and Sons, Asia Pvt. Ltd., Singapore.
10. V.R. Khanna and R.S. Bedi (1998), Text book of Sound 1st Edn. Kedharnaath Publish and Co, Meerut.
11. D.R. Khanna and H.R. Gulati (1979), Optics, S. Chand and Co. Ltd., New Delhi.
12. R. Murugesan (2005), Optics and Spectroscopy, S. Chand and Co, New Delhi.

Course Title:	ALLIED PHYSICS – I	Course Type: Practical I
Course Code: 23APP1		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy :		
Minimum Contact Hours: 18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1 :	Expert 2 :
Prof. A. Charles Hepzy Roy	Dr. J.V. Bynaja	Dr.T.R. Beena
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Apply the equation of motion to one or two dimensions of the system in order to understand kinematics of the body under the various conditions of applied force.	3[10] 6[10]	1, 2, 3,8	An, E	M
CLO-2	Apply the knowledge in construction of beams, bridges etc.	3[10] 6[10]	1, 2, 3,8	An, E	M
CLO-3	Apply knowledge in understanding the flow of liquid and surface tension applied on the surface of liquid	3[10] 6[10]	1, 2, 3,8	An, E	M

CLO-4	Study the elastic behaviour of materials Analyse the relationship between various types of experiments	3[10] 6[10]	1, 2, 3,8	An, E	M
CLO-5	Perform the procedure as per standard values	3[10] 6[10]	1, 2, 3,8	An, E	M

No.	Course Description
1	Young's modulus by non-uniform bending using pin and microscope
2	Young's modulus by non-uniform bending using optic lever, scale and telescope
3	Rigidity modulus by static torsion method
4	Rigidity modulus by torsional oscillations without mass
5	Surface tension and interfacial Surface tension – drop weight method
6	Comparison of viscosities of two liquids – burette method
7	Specific heat capacity of a liquid – Newton's law of cooling
8	Calibration of low range voltmeter using potentiometer
9	Determination of thermo emf using potentiometer
10	Verification of truth tables of basic logic gates using ICs
11	Verification of De Morgan's theorems using logic gate ICs.

Note: Use of digital balance permitted

SEMESTER – II

Course Title: Modern Indian Language – II Tamil		Course Type: Theory
Course Code: 23LT21		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr. D. Deva Sambath	Dr. S. Vaila Baby	Dr. V. Christal
Asso. Prof. & Faculty Head	Asso. Prof. of Tamil	Ass. Prof. of Tamil
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devasambath013@gmail.com	vailahenry50398@gmail.com	christalmoses123@gmail.com

CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	பக்தி இலக்கியங்களைக் கற்பதன் மூலம் பக்தி நெறியினையும் சமய நல்லிணக்கத்தையும் தெரிந்து கொள்வர்.	1(8), 3(12)	1, 3, 8	U	F
CLO-2	உரைநடை இலக்கியத்தைக் கற்பதன் மூலம் சமுதாயத்தில் மனிதர்கள் வாழும் முறைகளை அறிந்து கொள்வர்.	3(11), 3(9)	1, 2, 8	Ap	C
CLO-3	நாடக இலக்கியத்தை கற்பதன் மூலம் நாடக உத்தி முறைகளையும் நாடகம் எழுதும் திறனையும் கதைக் கூறுகளையும் அறிவர்.	9(12), 10(8)	5, 6, 10	R	F
CLO-4	போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்கு உரிய பயிற்சியைப் பெறுவர்	6(13), 7(7)	1, 3, 7	An	P
CLO-5	தமிழ் வரலாற்றினை சமூகப் பண்பாட்டு இலக்கியங்கள் வாயிலாக அறிவர்.	8(10), 9(10)	4, 9	C	P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	செய்யுள் - பக்தி இலக்கியம், சிற்றிலக்கியம்					
1.1	பக்தி இலக்கியம் சிற்றிலக்கியம் விளக்கம் மற்றும் வகைகள்	2	1(11)	Lec	Qui	1
1.2	தேவாரம் திருநாவுக்கரசர் (மறுமாற்றத் திருத்தாண்டகம்)	2	1(11)	Lec	SA	1
1.3	திருப்பாவை ஆண்டாள் (முதல் 10 பாடல்கள்)	2	1(11)	Lec	Qui	1
1.4	அருள் விளக்க மாலை வள்ளலார் (முதல் 10 பாடல்கள்)	2	1(11)	Lec	Qui	1
1.5	இரட்சணிய மனோகரம் எச்.எ. கிருட்டினப்பிள்ளை (பால்ய பிரார்த்தனை	2	1(11)	Lec	Sem	1

1.6	பராபரக்கண்ணி குணங்குடி மஸ்தான் சாகிபு (முதல் 10 கண்ணிகள்)	2	1(11)	Lec	SA	1
1.7	தமிழ் விடு தூது (முதல் 20 கண்ணிகள்)	2	1(11)	Lec	Qui	1
1.8	திருக்குற்றாலக் குறவஞ்சி (நாட்டுவளம் கூறுதல்)	2	1(11)	Lec	Qui	1
1.9	முக்கூடற் பள்ளு (குமுறல் கொடுமை)	2	1(12)	Lec	Qui	1
II	உரைநடை					
2.1	உரைநடை பொதுவான விளக்கம்	1	2(6)	Lec	Qui	2
2.2	சேமித்துப் பழகுவோம் அகிலன்	3	2(17)	Lec	Qui	2
2.3	பெண்மக்கள் கடமை மறைமலை	1	2(6)	Sem	Sem	2
2.4	அமரன் முன்றாம் உலகப்போர் முனைவர் தே. ஞானசேகரன்	1	2(6)	Lec	SA	2
2.5	நடுநிலைமை மு. வரதராசன்	2	2(11)	Sem	CT	2
2.6	வாழ்வியல் நீதி - புலவர் செந்துறை முத்து	2	2(11)	Lec	Sem	2
2.7	கல்வியும் சமுதாய நலனும் - முனைவர் ச. திருச்சுபன்	2	2(11)	Lec	SA	2
2.8	தேனூர் வசுகந்தி கி.வி. ஐகந்நாதன்	2	2(11)	Lec	Qui	2
2.9	தமிழின் தொன்மையும் சிறப்பும்	2	2(11)	Lec	OT	2
2.10	இலை முதல் இ மெயில் வரை இ ஸ்டான்லி	2	2(12)	Lec	Qui	2
III	நாடகம்					
3.1	நாடகம் பற்றிய அறிமுகம்	1	3(6)	Lec	Qui	3
3.2	ஆசிரியர் அறிமுகமும் படைப்புகளும்	1	3(6)	Lec	SA	3
3.3	இராவணன் மாளிகை	2	3(11)	Sem	Qui	3
3.4	நீதிதேவன் மாளிகை	2	3(11)	Lec	Qui	3
3.5	தவச்சாலை	2	3(11)	Lec	SA	3
3.6	தேவலோகம்- அறமன்றம்	2	3(11)	Lec	GD	3
3.7	இராவணன் நீதிதேவன் வருகை	2	3(11)	Sem	Qui	3
3.8	கோபமாக கம்பர் வருகை	2	3(11)	Sem	Qui	3
3.9	அறநெறி கூறுவோர் அறுவர்	2	3(11)	Lec	QA	3
3.10	நீதி கூறல்	2	3(11)	Lec	GD	3

1. தமிழ் இலக்கிய வரலாறு சிற்பி. பாலசுப்பிரமணியன்இ சாகித்ய அகாடெமிஇ சென்னை 2013
2. பொதுத்தமிழ்இ தமிழ்த்துறை ஸ்காட் கிறிஸ்தவக் கல்லூரி நாகர்கோவில்
3. நீதிதேவன் மயக்கம்இ பேரறிஞர் அண்ணாஇ பூம்புகார் பதிப்பகம் சென்னை
4. நன்னூல் கழக வெளியீடுஇ சைவ சித்தாந்த நூற்பதிப்புக் கழகம் சென்னை
5. தமிழ்நாடு பாடநூல் பொதுத்தமிழ் (6 முதல் 10 வரை)
6. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறுஇ முனைவர் பாக்கய மேரிஇ நியூ செஞ்சுரி புக் ஹவுஸ் (பி)லிட்இ அம்பத்தூர்இ சென்னை 2008.

Course Title:	Modern Indian Language – II Malayalam	Course Type: Theory
		Course Code: 23LM21
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr.Jisha.S.K	Dr.Pramod Kumar D.N	Dr. Suja S.
Ass. Prof. & Faculty Head	Asso. Prof. of Malayalam	Asso. Prof. of malayalam
+918606520272	+919446551748	+918590178009
jisha@scottchristian.org	pramodrds@gmail.com	sujasdr@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand and review Malayalam Poems in different periods.	1(10), 5(10)	1, 6, 8	1,2,3	U
CLO-2	Understand the impact of various theories.	1(5), 2(5), 3(10)	1, 2, 3, 5	1,3	U, An
CLO-3	Evaluate the characteristics of Poetries and obtain the poetry narrative techniques.	5(10), 10(10)	1, 3, 7	1,2,5	An, E
CLO-4	Understand the word level and sentence level Poetry writing styles.	9(10), 10(10)	3, 7	1, 9, 10	An, E

CLO-5	Evaluate the different texts and obtain moral values.	5(10), 9(10)	6, 7	1,2,5	U, E
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Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	Pracheenakhattam					
1.1	Paattu	1	1[15]	Lec	CA	8,9,10,11,12
1.2	Naadan Paattu	1	1[20]	Lec	HrA	8,9,10,11,12
1.3	nalacharitham (Naadan Paattu)	1	1[15]	Lec	CA	8,9,10,11,12
1.4	Gaadha	1	1[15]	Lec	CA	1
1.5	Bhakthi Prasthaanam	4	1[20]	Lec	HrA	2,3, 11,12
1.6	Poonthanam jnanappana	10	1[15]	Lec	CA	8,9,10,11,
II	Navodhanavum Navodhana anandara Pravanathakalum					
2.1	Kalpanikaprasthanam	2	2[20]	GD	ST	8,9,10,11,12
2.2	Kumaranasan	2	2[20]	GD	ST	4,5,8,9
2.3	Duravastha – kumaranasaan	7	2[20]	GD	ST	8,9,10,11,12
2.4	Edasseri	2	2[20]	kLec	OT	8,9,10,11,12
2.5	Karuththachettichikal – Edasseri	5	2[20]	Sem	OBT	8,9,10,11,12
III	Aadhunika khattam					
3.1	Aatdhunika kavithayude savishesathakal	3	2[20]	Qui	MCQ	8,9,10,11,12
3.2	Kakkadinte kavyalokam	3	2[20]	Qui	MCQ	8,9,10,11,12
3.3	Kakkadu – safalameeyaathra	4	4[20]	Qui	MCQ	8,9,10,11,12
3.4	Ayyappanikkarude jeevithavum thayum	4	3[20]	Lec	HoA	8,9,10,11,12
3.5	Ayyappanikkar – Kaadevide Makkale	4	3[20]	GL	MCQ	8,9,10,11,12

IV	Aadhunika Ananthara khattam					
4.1	Post Modernism	2	4[10]	CS	Ess	6,7
4.2	Dalith vaadam,	2	4[15]	Lec	MCQ	6,7
4.3	Paristhithivaadam	2	4[15]	GD	SA	6,7
4.4	Sthreevaadam	3	4[20]	CS	Ess	6,7
4.5	Bhaagavatham – Vijayalekshmi	3	4[10]	Lec	MCQ	6,7
4.6	Malayala kavithaykku oru kaththu	3	4[20]	CS	Ess	6,7
4.7	Uththamapurushan Kadha parayumpol	3	4[10]	Lec	MCQ	6,7
V	Cyber Kavitha					
5.1	Digital Saangethikathayude	2	5[15]	Lec	HrA	7,11,12
5.2	Printing Meedia	2	5[15]	GS	CA	7,11,12
5.3	Kavithaapooranam	2	5[10]	GS	MCQ	7,11,12
5.4	Chithrarechana	2	5[10]	Lec	HrA	7,11,12
5.5	Inter Active Poetry	2	5[10]	GS	CA	7,11,12
5.6	hyper Text	4	5[10]	Lec	MCQ	7,11,12
5.7	Game – Viswaprasaad	2	5[15]	Lec	HrA	7,11,12
5.8	Blog – ottamazha 2010	2	5[15]	Lec	MCQ	7,11,12

BOOKS FOR REFERENCE:

1. Mukudhan N, Gadha, keralabhasha Institute: Thiruvananthapuram, 2013.
2. Ezhuthachan, Ramayanam Kilipattu, N.B.S: Kottayam, 2012
3. Mukundhan N, Kilippattu, Keralabhasha Institute, Thiruvananthapuram, 2013
4. Kumaranashan ,veenapovu, D.C.Books: Kottayam, 1988
5. Susheelan K. P, Kumaranashane orkkumbol, Keralabhasha Institute, Thiruvananthapuram, 2013
6. P.P.K Pothuvaal, Paristhithi kavithaykkoraamukham, D.C Books, Kottayam 1995.
7. Balachandran Vadakkedath, Aadhunikathaykkum Utharaadhunikaykkum edayil, Pranatha Books , Cochin
8. Leelavathy.M, Kavithasahithya charithram, Keralanbhasha Institute: Thiruvananthapuram, 2013
9. George K.M, Aadhunika Malayala sahithya Charithram prasthanagaliloode, Kottayam :DC books.
10. George.K.M, Sahithya Charithram prasthanagaliloode, Kottayam , Sahithya Pravarthaka saharana Sangam, 1958.
11. Krishna Pilla N, Kairaliyude kadha, D.C. Books, Kottayam, 1958.

12. Venugopan Nair. S. V., Malayala Bhasha Charitram, Maluben publications, Thiruvananthapuram. 2000.

Course Title:	Modern Indian Language – II Hindi	Course Type: Theory
		Course Code: 23LH21
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Mrs. Josy Vincent	Dr.Sreedevi S	Dr.Jayasree. K.
Ass. Prof. of Hindi	Ass. Prof. of Hindi	Ass. Prof. of Hindi
+9486357323	+919495243814	+919539204383
josysam2020@gmail.com	sdtvpm@yahoo.com	ayasree8262@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand Hindi Fiction	1(5), 2(10), 5(5)	1, 2, 5, 6, 8, 10	U	M,F, C
CLO-2	Evaluate social values through stories	2(10), 3(10)	1, 2, 3,	U, An	M,C
CLO-3	Remember cultural values through reading passages	2(5), 5(5), 10(10)	1, 2, 3, 6, 7	An, E	M,P
CLO-4	Apply practical grammar	9(10), 10(10)	8, 3, 7	An, E	M,C
CLO-5	Evaluate modules related to fiction based on competitive examinations	1(5), 5(10), 9(5)	1, 7, 8	U,E	M,C,P

Modle	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	Hindi Katha sahithya Parichay					
1.1	Kahani ke thathva	6	1[20]	Lec	CA	1,2,3

1.2	Hindi ke Pramukha kahaanikarom ka	4	1[30]	Lec	CA	1,2
1.3	Ekanki ke Thathva	5	1[25]	Lec	HrA	1,2
1.4	Hindi ke Pramukha ekankikarom ka parichay	3	1[25]	Lec	CA	1,2
II	Hindi Kahaniyaam					
2.1	Bade ghar ki betti – Premchand	6	1[30]	Lec	CA	1,2
2.2	Vo thera ghar Yah Mera ghar – Malathi Joshi	6	1[30]	Lec	HrA	1,2
2.3	Pita – Gyanarenjan	6	1[40]	Lec	CA	1,2
III	Hindi Ekanki					
3.1	Lekshmi ka Swagath – Upendranath ashk	6	1[30]	Lec	CA	1,2
3.2	Vibhajan – vushnu prabhakar	6	1[40]	Lec	HrA	1,2
3.3	Maa Baap – Srivishnu	6	1[30]	Lec	CA	1,2
IV	vyakaran					
4.1	Kriya visheshan	6	1[25]	Lec	CA	1,2
4.2	Sambatha Bodhak	4	1[25]	Lec	CA	1,2
4.3	Samuchay Bodhak	5	1[25]	Lec	HrA	1,2
4.4	Vismaya Bodhak	3	1[25]	Lec	CA	1,2
V	Thakaneeki shabdh our anuvaad					
5.1	Thakaneeki Shabdh	9	1[50]	Lec	HrA	1,2
5.2	Chotte Chotte anuvaad	9	1[50]	Lec	CA	1,2

BOOKS FOR REFERENCE:

1. Aath Ekanki natak – Ed. Dr.Ramkumar Varma
2. Das Ekanki

Course Title:	Communicative English - II	Course Type:	Theory
Course Code: 23LE21			
Total Hours: 90	Hours/Week: 6	Credits: 3	
Pass-Out Policy:			
Minimum Contact Hours: 54			
Total Score %: 100		Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
Dr. L. Judith Sophia	Dr. A. Belinda Asir	Mrs. P. Jemimma	
Asso. Prof. of English	Ass. Prof. of English	Ass. Prof. of English	
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	1 (10) 6 (7) 7 (3)	2, 3	U AP	F P
CLO-2	Examine and present material of the prescribed texts and other texts	2 (8) 5 (12)	1, 2	U, An E	C M
CLO-3	Identify cross cutting issues like, Human values, (Professional, Personal and Domestic) ethics and environmental sustainability and practise them	3 (8) 8 (6) 9 (6)	1, 4, 8, 9	An E, Ap	C P
CLO-4	Present and differentiate various cultures and civilizations of the Globe and distinguish Indian traditional Knowledge	1 (10) 8 (5) 10 (5)	5, 6, 10	U, Ap	P M
CLO-5	Relate the textual content and underlying meaning of the context to the real life situations	5 (6) 8 (8) 10 (6)	1, 2, 5, 7	E, Ap, C	C M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	PROSE					
1.1	When You Dread Failure (1952)- A. J. Cronin					
1.1.1	Introduction to the author & the Essay	1	2 [4], 4 [10]	L	Ho A	1
1.1.2	Textual Analysis	2	2 [4]	L GD	SA	1

1.1.3	Thematic analysis: Developing positive mindset Discussion on Human values, Personal and Professional ethics	3	2 [4], 3[5], 5[7]	L GD	Essay	1
1.2	I Have a Dream (1963) - Martin Luther King Jr.					
1.2.1	Introduction to the author & the Essay	1	2 [4], 4 [10]	L	Ho A	1
1.2.2	Textual Analysis	2	2 [4]	L GD	MCQ	1
1.2.3	Themes: Sensitizing towards equality and liberty & Discussion on racial discrimination- reflection of Human values	3	2 [4], 3[5], 5[7]	L GD	Ess	1
1.3	I Plead that You Read- Shashi Tharoor (2023)					
1.3.1	Introducing the author & Essay	1	2 [4], 4 [8]	L	Ho A	1
1.3.2	Textual analysis	2	2 [4]	L, GD	S A	1
1.3.3	Thematic analysis: The need for critical reading	3	2 [4], 3[5],	L GD	Ess	1
II	POETRY					
2.1	Solitary Reaper - Wordsworth					
2.1.1	Introducing the poet & the poem	1	2[4] 4[5]	L	Ho A	1
2.1.2	Analysis of the poem	2	2[4]	L, GD	MCQ	1
2.1.3	Themes of the poem- Injustice; racial discrimination and Human values	2	2 [4], 3[4], 5[5]	GD, PS	Ass	1
2.2	Telephone Conversation - Wole Soyinka					
2.2.1	Introducing the poet & the poem	1	2[4] 4[5]	L	Ho A	1
2.2.3	Analysis of the poem	2	2[4]	L, GD	MCQ	1
2.2.4	Themes of the poem- Injustice; racial discrimination and Human values	2	2 [4], 3[4], 5[5]	GD, PS	Ass	1

2.3	On Killing a Tree- Gieve Patel					
2.3.1	Introducing the poet & the poem	1	2 [4] 4[5]	L	Ho A	1
2.3.2	Analysis of the poem	2	2[4]	L GD	S A	1
2.3.3	Themes: Creating awareness to protect trees; Environmental issues	1	2 [4], 3[4],	L GD	Ess	1
2.4	Still I Rise - Maya Angelou					
2.4.1	Introducing the poet & the poem	1	2 [4] 4[5]	L	Ho A	1
2.4.2	Analysis of the poem	1	2[4]	L GD	S A	1
2.4.3	Human Values & gender issues in “Still I Rise”	2	2 [4], 3[4],	L GD	Ess	1
III	FICTION					
3.1	<i>The Lion, the Witch and the Wardrobe- C. S. Lewis</i>					
3.1.1	Plot & Character analysis	7	2 [5]	L	MCQ	2
3.1.2	Compare and contrast the characters	3	2 [6]	GD	S A	2
3.1.3	Thematic analysis: Conflict between Good and Evil	4	2 [5] 4[20]	L GD	Ess	2
3.1.4	Human Values reflected in <i>The Lion, the Witch and the Wardrobe</i>	2	2 [5], 3[12], 5[10]	GD CCC	Ass	2
3.1.5	Ethical issues presented in <i>The Lion, the Witch and the Wardrobe</i>	2	2 [5], 3[12], 5[10]	GD CCC	S A	2
IV	LANGUAGE STUDY					
4.1	Grammar Units 26-53 (<i>Essential English Grammar</i> by Raymond Murphy)	18	1[100]	CCC	Hr A	3
V	LANGUAGE IN PRACTICE					

5.1	Vocabulary: One Word Substitutes One Word substitutes for Person: 1. Anthropologist, 2. Anchor, 3. Celebrity 4. Extrovert, 5. Humanitarian, 6. Hypocrite, 7. Optimist, 8. Philanthropist, 9. Philatelist, 10. Teetotaller. One Word substitutes for Generic terms: 1. Almanac, 2. Axiom, 3. Biopsy, 4. Chronology, 5. Extempore, 6. Integrity, 7. Panacea, 8. Plagiarism, 9. Souvenir, 10. Utopia. One Word Substitutes for Venue/ Spot: 1. Archives, 2. Aviary, 3. Aquarium, 4. Arena, 5. Burrow, 6. Cemetery, 7. Gymnasium, 8. Kennel, 9. Orchard, 10. Wardrobe.	5	1[26]	CCC	CT	4
5.2	Taking and Making Notes	3	1[18]	ABL	CT	4
5.3	Writing Paragraphs	3	1[18]	ABL	CT	4
5.4	Reading for General and Specific Information (Only for- Viva/Practical purpose) [Interpreting Charts, Tables, Schedules, Graphs, Maps etc.]	3	1[18]	ABL PL	Practical	4
5.5	Spoken English (Practical) Situational Conversations: <ul style="list-style-type: none"> ● At the Booking counter in a Bus Stand and Railway Station ● At the reception counter to book a room ● At restaurant ordering food At the bank to open an account	4	1[20]	PL	Practical	4

BOOKS FOR REFERENCE:

1. *Orchard: Semester 11 Prose and Poetry*. Edited by the Department of English, 2024.
2. Lewis, C. S. (1950). *The Chronicles of Narnia: The Lion, the Witch and the Wardrobe*. Harpercollins Children's Book, 2009.
3. *Essential English Grammar* by Raymond Murphy
4. *Language in Use: Work Book 11*. Edited by the Department of English

Course Title:	THERMAL PHYSICS		Course Type: Theory
			Course Code: 23GP21
Total Hours: 60	Hours/Week: 4	Credits: 4	
Pass-Out Policy :			
Minimum Contact Hours: 36			
Total Score %: 100	Internal: 40	External: 60	
Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Hepzy Roy	Dr. Y. Premila Rachelin	Dr. V. Anslin Ferby	
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Asso. Prof. of Physics	
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Describe the various concepts related to thermometry and	1[10] 2[10]	1,2,3	R	F, C
CLO-2	Develop knowledge about the different methods of heat Transmission.	1[10] 2[10]	1,2,3	U	C, P
CLO-3	Explain the different laws and postulates in kinetic theory of gases.	1[10] 2[10]	1,2,3	Ap	C,M
CLO-4	Understand the fundamental aspects of thermal physics. Use the laws of thermodynamics (particularly the first and second laws) to solve a variety of problems, such as the expansion of gases and	1[10] 2[10]	1,2,3	R	P
CLO-5	Idea on postulates of statistical mechanics, statistical interpretation of thermodynamics, microcanonical, canonical and grand canonical	1[10] 2[10]	1,2,3	Ap	P,M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	THERMOMETRY AND CALORIMETRY					
1.1	Platinum resistance thermometer	1	1[10]	Lec	SA	1

1.2	Calendar and Griffith's bridge	1	1[10]	Lec	Ess	1
1.3	Thermoelectric effect	1	1[10]	GD	Quiz	1
1.4	Seebeck effect	1	1[10]	GT	Ass	1
1.5	Thermoelectric thermometers	1	1[10]	Lec	SA	1
1.6	International temperature scale	1	1[5]	Lec	Sem	1
1.7	Thermistor	1	1[5]	EL	Ass	1
1.8	Specific heat capacity of solids- Regnault's method of mixtures(solid)	1	1[10]	Lec	Ess	1
1.9	Specific heat capacity of gases C_p and C_v - Meyer's relation	2	1[10]	Lec	Ess	1
1.10	Joly's method for determination of C_v	1	1[10]	Lec	Ess	1
1.11	Regnault's method for determination of C_p	1	1[10]	Lec	SA	1
II	TRANSMISSION OF HEAT					
2.1	Conduction - coefficient of thermal conductivity	1	2[5]	Lec	SA	1,3
2.2	Determination of thermal conductivity of a good conductor by Forbe's method	1	2[15]	Lec	Ess	1,3
2.3	Determination of thermal conductivity of a bad conductor by Lee's disc method.	1	2[15]	Lec	Ess	1,3
2.4	Convection-application	1	2[5]	GD	SA	1,3
2.5	Radiation: black body radiation (Ferry's method)	1	2[5]	Lec	SA	1,3
2.6	Wien's black body	1	2[5]	Lec	SA	1,3
2.6	Distribution of energy in black body radiation - Wien's law and Rayleigh law's law	1	2[10]	GD	Se n	1,3
2.7	Planck's law of radiation	1	2[5]	GT	Ass	1,3
2.8	Stefan's law - Thermodynamical proof	1	2[10]	Lec	SA	1,3
2.9	Deduction of Newton's law of cooling from Stefan's law	1	2[10]	Lec	SA	1,3
2.10	Experimental verification of Stefan's law	1	2[15]	Lec	Ess	1,3
III	KINETIC THEORY OF GASES					
3.1	Kinetic Theory of gases- assumptions	1	3[10]	Lec	SA	1,2
3.2	Molecular collisions	1	3[5]	GD	Ass	1,2
3.3	Expression for the pressure of a gas	1	3[10]	Lec	SA	1,2
3.4	Mean free path - Clausius expression for mean free path	1	3[10]	Lec	SA	1,2

3.5	Transport phenomenon – Brownian motion and its features	2	3[10]	GT	Ess	1,2
3.6	Expression for viscosity, Diffusion and thermal conductivity of gas	1	3[15]	Lec	Ess	1,2
3.7	Experimental verification	1	3[10]	Lec	Ess	1,2
3.8	Vander walls equation of state	1	3[10]	Lec	Ass	1,2
3.9	Determination of Vander walls constant	2	3[10]	Lec	Ess	1,2
3.10	Relation between Vander Wall's constant and critical constants.	1	3[10]	OO	SA	1,2
IV	THERMODYNAMICS					
4.1	Zeroth law and first law of thermodynamics	1	4[5]	GD	SA	1
4.2	Application of first law	1.5	4[10]	Lec	Ess	1
4.3	Isochoric – Adiabatic – Isobaric – Isothermal	1	4[5]	Lec	SA	1
4.4	work done during adiabatic and isothermal process	1	4[10]	Lec	SA	1
4.5	Relation between Adiabatic – Isothermal	1	4[5]	GT	SA	1
4.6	Second law of thermodynamics – Carnot's engine – its efficiency	2	4[10]	Lec	Ess	1
4.7	Entropy of an ideal gas	1	4[10]	Lec	Ess	1
4.8	Entropy changes in reversible and irreversible processes	1	4[10]	GT	SA	1
4.9	T-S diagram –thermodynamicalscale of temperature	1	4[5]	TPS	Ass	1
4.10	Maxwell's thermodynamical relations	1.5	4[15]	Lec	Ess	1
4.11	Clasius- Clapeyron's equation (first latent heat equation)	1	4[10]	Lec	SA	1
4.12	Third law of thermodynamics – unattainability of absolute zero – heat death	1	4[5]	TPS	Sem	1
V	STATISTICAL MECHANICS					
5.1	Definition of phase-space	1	5[5]	Lec	Sem	1
5.2	Micro and Macro states	1	5[5]	GD	SA	1
5.3	Ensembles –different types of ensembles	1.5	5[10]	GT	SA	1
5.4	Classical and quantum Statistics	1	5[5]	Lec	Ass	1

5.5	Maxwell-Boltzmann statistics	1.5	5[10]	Lec	Ess	1
5.6	Expression for distribution function	1	5[15]	Lec	Ess	1
5.7	Bose-Einstein statistics	1	5[10]	GD	SA	1
5.8	Expression for distribution function	1.5	5[15]	Lec	Ess	1
5.9	Fermi-Dirac statistics	1	5[5]	GT	SA	1
5.10	Expression for distribution function	1.5	5[15]	Lec	Ess	1
5.11	Comparison of three statistics	1	5[5]	TPS	Ass	1

BOOKS FOR REFERENCE:

1. Brijlal N. Subramanyam, P.S. Hemne, Heat and thermodynamics and Statistical Physics, S. Chand & Company Ltd., New Delhi, 2010.
2. D.S. Mathur, Heat and Thermodynamics, Sultan Chand & Sons, New Delhi, 1998.
3. M. Narayanamurti & Nagaratnam, Heat, The National Publishing Co., Madras, 1987.
4. Sears and Salinger, Thermodynamics, Addison-Wesley Publishing Co., 1975.
5. Kerson and K. Huang, Statistical Mechanics, John Wiley & Sons, Inc., New York, 1963.
6. A.K. Dasgupta, Fundamentals of Statistical Mechanics, New Central Book Agency (P) Ltd., Calcutta, 2000.
7. Sears and Zymanski, Statistical Mechanics, McGraw Hill Book Company, New York, 1961.
8. Fundamentals of Statistical and Thermal Physics, Federick Reif, McGraw Hill International, Editions, Singapore, 1985.

Course Title:	OPTICS	Course Type:	Theory
		Course Code: 23GP22	
Total Hours: 60	Hours/Week: 4	Credits: 4	
Pass-Out Policy :			
Minimum Contact Hours: 36			
Total Score %: 100		Internal: 40	External: 60
Minimum Pass %: 40		[No Minimum for Internal]	
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Hepzy Roy	Dr. J.V. Bynaja	Dr. Y. Sheeba Sherlin	
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Asso. Prof. of Physics	
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Explain the basic optical principles and phenomena	1[10] 2[10]	1,2,3	R, U	C, F
CLO-2	List out the fundamental laws governing geometrical and wave optics	1[10] 2[10]	1,2,3	R	F, P
CLO-3	Apply physics and mathematical concepts in deciphering problems related to optics	1[10] 2[10]	1,2,3	Ap, E	C, P
CLO-4	Distinguish various optical phenomena and instruments. Discuss the phenomena of reflection, refraction, dispersion, interference, diffraction and	1[10] 2[10]	1,2,3	An, E	P, M
CLO-5	Determine various optical parameters by using optical components and instruments in	1[10] 2[10]	1,2,3	U, Ap	F, P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	REFRACTION IN LENSES					
1.1	Fermat's principle of least time – Statement and proof	1	1[10]	Lec	SA	1,2
1.2	Fermat's principle of extremum path	1	1[10]	GT	SA	1,2
1.3	Deduction of laws of reflection – statement and proof	1.5	1[10]	Lec	Ess	1,2
1.4	Deduction of laws of refraction – statement and proof	1.5	1[10]	Lec	Ess	1,2
1.5	The Thin lens formula	1.5	1[10]	Lec	Ess	1,2
1.6	Refraction at a convex surface forms a real image	1	1[10]	Lec	SA	1,2
1.7	Focal length of two thin converging lenses separated by a distance, when the object is kept at infinity	1	1[10]	Lec	Ess	1,2
1.8	Law of refraction at a spherical refracting surface	1.5	1[15]	Lec	Ess	1,2

1.9	Thick lens equation	2	1[15]	Lec	Ess	1,2
II	DISPERSION AND ABERRATIONS					
2.1	Dispersion by a prism- Dispersion, spectrum, dispersive medium, VIBGYOR, Ultraviolet, infrared – definitions	1	2[5]	Lec	Q	1,2
2.2	Refraction through a prism to show $\delta_m = (\mu - 1) A$	1	2[10]	Lec	SA	1,2
2.3	Angular dispersion to show $\theta = (\mu_V - \mu_R)A$	1	2[10]	Lec	SA	1,2
2.4	Dispersive power, ω	0.5	2[5]	Lec	SA	1,2
2.5	Achromatic combination of prisms – deviation without dispersion – statement and proof.	1	2[10]	Lec	Ess	1,2
2.6	Dispersion without deviation – statement and proof	1	2[10]	Lec	Ess	1,2
2.7	Application for dispersion without deviation – Direct Vision Spectroscope	1	2[10]	Lec	Ess	1,2
2.8	Spherical Aberration – longitudinal and lateral spherical aberration	1	2[10]	Lec	SA	1,2
2.9	Methods of reducing spherical aberration	0.5	2[10]	GT	SA	1,2
2.10	Chromatic aberration in a lens (i) Longitudinal chromatic aberration for an object at infinity (ii) Longitudinal chromatic aberration for an object at finite distance	1.5	2[10]	Lec	Ess	1,2
2.11	Achromatic lenses - Condition for achromatism of two lenses placed in contact - Condition for achromatism of two thin lenses separated by a finite distance	1.5	2[10]	Lec	Ess	1,2
III	INTERFERENCE					
3.1	Light waves	0.5	3[10]	Lec	Ass	1,2
3.2	Features about a mathematical wave: Monochromatic, plane-polarized wave, phase difference and coherence, optical path and phase change, effect of optical path, effect of reflection	1	3[10]	Lec	SA	1,2

3.3	Superposition of waves - Principle of superposition	1	3[10]	Lec	Ass	1,2
3.4	Interference - Explanation theory of interference, Analytical method	1.5	3[10]	Lec	Se n	1,2
3.5	Young's double slit experiment - Wave front division -Optical path difference between the waves, bright fringes, dark fringes, separation between neighbouring bright fringes	1	3[10]	Lec	Ass	1,2
3.6	Conditions for interference - conditions for sustained interference	1.5	3[10]	GT	SA	1,2
3.7	Fresnel's Biprism - Theory & experiment	1	3[10]	Lec	Ass	1,2
3.8	Interference in thin film - Explanation	1	3[10]	Lec	SA	1,2
3.9	Michelson's Interferometer - Principle, construction and working	1.5	3[10]	Lec	Se n	1,2
3.10	Application of Michelson Interferometer - Measurement of wavelength	1	3[10]	OO	Pro	1,2
IV	DIFFRACTION					
4.1	Introduction	0.5	4[5]	Lec	Q	1,2
4.2	Fresnel's assumptions	1	4[5]	Lec	Pro	1,2
4.3	Rectilinear propagation of light - explanation	1.5	4[10]	GT	Ass	1,2
4.4	Zone plate - explanation	1	4[10]	Lec	SA	1,2
4.5	Difference between a zone plate and a convex lens	1	4[10]	GT	Ass	1,2
4.6	Distinction between interference and diffraction	1	4[10]	GT	SA	1,2
4.7	Fresnel and Fraunhofer types of diffraction	1	4[10]	GT	Se n	1,2
4.8	Diffraction at an opaque circular disc	1	4[10]	OO	Pro	1,2
4.9	Diffraction pattern due to a straight edge: Explanation, positions of maximum and minimum intensity, intensity at a point inside the geometrical shadow.	1.5	4[10]	Lec	Ess	1,2
4.10	Diffraction pattern due to narrow wire	1	4[10]	EL	Pro	1,2
4.11	Fraunhofer diffraction at a single slit (calculus method)	1.5	4[10]	Lec	Ess	1,2
V	POLARIZATION					

5.1	Introduction	0.5	5[5]	PT	Qui	1,2
5.2	Production of linearly polarised light:	0.5	5[5]	PT	Ess	1,2
5.3	Polarization by reflection	1	5[10]	PT	Qui	1,2
5.4	Brewster's law & its application	1	5[10]	OO	SA	1,2
5.5	Preferential direction in a wave	1	5[5]	OO	Qui	1,2
5.6	Polarized light	0.5	5[5]	Lec	SA	1,2
5.7	Polarization by refraction – pile of plates	1	5[10]	PT	Ess	1,2
5.8	Polarization by double refraction	0.5	5[10]	GT	Ess	1,2
5.9	Polarizer and analyser, Fabrication of linear polarizer	1	5[10]	GT	MCQ	1,2
5.10	Nicol prism – working, effect of analyser on plane polarized light – Malus law	2	5[10]	GT	MCQ	1,2
5.11	Quarter and half wave plate -Production and detection of elliptically polarised light	1.5	5[10]	Lec	Ess	1,2
5.12	Optical activity, Fresnel's explanation of optical activity – experimental verification	1.5	5[10]	Lec	Ess	1,2

BOOKS FOR REFERENCE

1. Brijlal and Subramaniam, A Textbook of Optics, S. Chand & Co., New Delhi, 2006.
2. N. Subramanyan, Brijlal, M.N. Avadhanulu, A Textbook of Optics, S. Chand & Company Limited.
3. Ajoy Ghatak, Optics, Tata McGraw – Hill Publishing Co., Ltd., New Delhi, 2005.
4. P.K. Chakrabarti, Geometrical and Physical Optics, New Central Book agency (P) Ltd., Kolkata, 2004.
5. S.P. Singh and J.P. Agarwal, Optics and Atomic Physics, Pragati Prakasham, Meerut, 1972.
6. Halliday, Resnick, Fundamentals of Physics, VIII Edi., Wiley, India, 2009.

Course Title:	THERMAL PHYSICS	Course Type: Practical II
Course Code: 23GPP2		
Total Hours: 30	Hours/Week: 4	Credits: 2
Pass-Out Policy :		
Minimum Contact Hours: 18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. J.V. Bynaja	Dr. T.R. Beena
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Ass. Prof. of Physics
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Study the elastic behaviour of materials	2[10] 6[10]	1, 2, 3	An, E	M
CLO-2	Analyse the relationship between various types of experiments	2[10] 6[10]	1, 2, 3	An, E	M
CLO-3	Perform the procedure as per standard values	2[10] 6[10]	1, 2, 3	An, E	M
CLO-4	Understan the applications	2[10] 6[10]	1, 2, 3	An, E	M
CLO-5	Perform the procedure as per standard values	2[10] 6[10]	1, 2, 3	An, E	M

Course Description	
1.	Specific heat capacity of a liquid – (i) Newton's law of cooling (ii) Emissivity of the surface of the spherical calorimeter
2.	Specific heat capacity of Solid - Method of mixtures (Half- time correction)
3.	Specific heat capacity of liquid - Method of mixtures (Half- time correction)
4.	Thermal conductivity of a bad conductor-Lee's disc (Cardboard/Ebonite)
5.	Thermal conductivity of a good conductor (Searle's Method)
6.	Verification of Newton's law of cooling
7.	Temperature coefficient of Resistance- Platinum resistance Thermometer - Meter Bridge
8.	Specific latent heat of fusion of Ice
9.	Specific latent heat of steam
10.	Melting point of solid-Paraffin wax
11.	Boiling point of a liquid (Benzene/Toluene)
12.	Thermo emf of a thermo-couple using Mirror Galvanometer
13.	Forbes method to determine thermal conductivity (static)
14.	Specific Heat capacity of liquid- Joules Calorimeter experiment

Course Title:	ALLIED PHYSICS – II	Course Type: Theory
Course Code: 23AP02		
Total Hours: 60	Hours/Week: 4	Credits: 4
Pass-Out Policy : Minimum Contact Hours: 36 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. T.R. Beena	Dr. D. Hudson Oliver
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CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO- 1	Explain the concepts of interference diffraction using principles of superposition and rephrase the concept of polarization based on wave patterns	3[10] 5[10]	1,2,7,8,10	R, Ap	F, C
CLO- 2	Outline the basic foundation of different atom models and various experiments establishing quantum concepts.	3[10] 5[10]	1,2,7,8,10	U, An	C, M
CLO- 3	Summarize the properties of nuclei, nuclear forces, structure of atomic nucleus and nuclear models. Interpret nuclear processes like fission and fusion.	3[10] 5[10]	1,2,7,8,10	An	F, M
CLO- 4	Describe the basic concepts of relativity inertial frames and transformation equations.	3[10] 5[10]	1,2,7,8,10	A, E	P, M
CLO- 5	Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices	3[20] 5[20]	1,2,7,8,10	U, C	P, M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I OPTICS						
1.1	Interference	1	1[10]	Lec	SA	1, 2
1.2	Interference in thin films – colors of thin films	1	1[10]	Lec	Ess	1, 2
1.3	Air wedge – Determination of diameter of a thin wire by air wedge	1	1[10]	EL	Se	1, 2
1.4	Diffraction – Fresnel and Fraunhofer diffraction	2	1[10]	GD	SA	1, 2
1.5	Normal incidence – experimental determination of wavelength using diffraction grating (no theory)	2	1[10]	EL	Ess	1, 2
1.6	Polarization	1	1[10]	Lec	SA	1, 2
1.7	Brewster's law	1	1[10]	Lec	Ess	1, 2
1.8	Polarization by double refraction	1	1[10]	Lec	Ess	1, 2
1.9	Optical activity	1	1[10]	Lec	Ess	1, 2
1.10	-Application in sugar industries	1	1[10]	GD	As	1, 2
II ATOMIC PHYSICS						
2.1	Atom models – Bohr atom model	1	2[10]	Lec	Ess	1, 2
2.2	Vector atom model - Various quantum numbers	2	2[10]	Lec	Ess	1, 2
2.3	Pauli's exclusion principle	1	2[10]	Lec	SA	1, 2
2.4	Periodic classification of elements	1	2[10]	BS	Se n	1, 2
2.5	Bohr magneton	1	2[10]	Lec	SA	1, 2
2.6	Stark effect	1	2[10]	Lec	Ess	1, 2
2.7	Zeeman effect (elementary ideas only)	1	2[10]	Lec	Ess	1, 2
2.8	Photo electric effect	1	2[10]	Lec	SA	1, 2
2.9	Einstein's photoelectric equation	1	2[10]	BS	Ess	1, 2
2.10	Applications of photoelectric effect - Solar cells - Solar panels	2	2[10]	GD	As s	1, 2
III NUCLEAR PHYSICS						
3.1	Nuclear Models – liquid drop model	1	3[10]	Lec	Ess	1, 2
3.2	Magic numbers – shell model	1	3[10]	Lec	Ess	1, 2
3.3	Mass defect – binding energy	1	3[10]	Lec	Ess	1, 2
3.4	Radioactivity – uses – half life – mean life	1	3[10]	TPS	MC Q	1, 2
3.5	Nuclear fission – energy released in fission – chain reaction	1	3[10]	Lec	Ess	1, 2

3.6	Atom bomb	1	3[10]	GD	Se n	1, 2
3.7	Nuclear reactor	1	3[10]	Lec	Ess	1, 2
3.8	Introduction to Department of Atomic Energy (DAE), International Atomic Energy Agency (IAEA)	2	3[10]	GD	As s	1, 2
3.9	Nuclear fusion - thermonuclear reactions	2	3[10]	Lec	Ess	1, 2
3.10	Differences between fission and fusion	1	3[10]	TPS	SA	1, 2
IV INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES						
4.1	Frame of reference	1	4[10]	Lec	SA	1, 2
4.2	Postulates of special theory of relativity	1	4[10]	Lec	Se n	1, 2
4.3	Galilean transformation equations	1	4[10]	BS	Ess	1, 2
4.4	Lorentz transformation equations - derivation	2	4[10]	BS	Ess	1, 2
4.5	Length contraction	1	4[10]	BS	Ess	1, 2
4.6	Time dilation	1	4[10]	BS	Ess	1, 2
4.7	Twin paradox	1	4[10]	BS	Ess	1, 2
4.8	Mass-energy equivalence	1	4[10]	Lec	SA	1, 2
4.9	Introduction on gravitational waves,	1	4[10]	Lec	SA	1, 2
4.10	Laser Interferometer Gravitational-Wave Observatory (LIGO) - Opportunities at International Centre for Theoretical Sciences (ICTS)	2	4[10]	GD	As s	1, 2
V SEMICONDUCTOR PHYSICS						
5.1	p-n junction diode	1	5[15]	Lec	Qu i	1, 2
5.2	Forward biasing, Reverse biasing	2	5[10]	Lec	Ess	1, 2
5.3	Characteristic of diode	1	5[10]	Lec	Ess	1, 2
5.4	Zener diode	1	5[10]	Lec	Ess	1, 2
5.5	Characteristic of zener diode	1	5[10]	Lec	Ess	1, 2
5.6	Voltage regulator	1	5[10]	Lec	Se n	1, 2
5.7	Full wave bridge rectifier - construction and working - advantages (no mathematical treatment)	2	5[15]	Lec	Ess	1, 2
5.8	USB cell phone charger	1	5[10]	GD	Ess	1, 2
5.9	Introduction to e-vehicles	2	5[10]	GD	As s	1, 2

BOOKS FOR REFERENCE:

1. R. Murugesan (2001), Allied Physics, S. Chand and Co, New Delhi.
2. R. Murugesan (2005), Modern Physics, S. Chand & Co, New Delhi.
3. K. Thangaraj and D. Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.

4. Brijlal and N. Subramanyam (2002), Text book of Optics, S. Chand & Co, New Delhi.
5. A. Subramaniyam, Applied Electronics, 2nd Edn., National Publishing Co., Chennai.
6. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., John Wiley and Sons, Asia Pvt. Ltd., Singapore.
7. D.R. Khanna and H.R. Gulati (1979). Optics, S. Chand & Co. Ltd., New Delhi.
8. A. Beiser (1997), Concepts of Modern Physics, Tata Mc Graw Hill Publication, New Delhi.
9. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, New Delhi.
10. V.K. Metha (2004), Principles of Electronics, 6th Edn., S. Chand and Company, New Delhi.

Course Title:	ALLIED PHYSICS – II	Course Type: Practical II
Course Code: 23APP2		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. Y. Sheeba Sherlin	Dr. T.R. Beena
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CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Apply the equation of motion to one or two dimensions of the system in order to understand kinematics of the body under the various conditions of applied force.	6[20]	1, 2, 3, 8	An, E	M
CLO-2	Apply the knowledge in construction of beams, bridges etc.	6[20]	1, 2, 3, 8	An, E	P
CLO-3	Apply knowledge in understanding the flow of liquid and surface tension applied on the surface of liquid	6[20]	1, 2, 3, 8	An, E	M
CLO-4	Study the elastic behaviour of materials Analyse the relationship between various types of experiments	6[20]	1, 2, 3, 8	An, E	P
CLO-5	Perform the procedure as per standard values	6[20]	1, 2, 3, 8	An, E	M

No.	Course Description
1	Radius of curvature of lens by forming Newton's rings
2	Thickness of a wire using air wedge
3	Spectrometer – Grating N, λ – Normal incidence
4	Spectrometer – Refractive Index and dispersive power
5	Determination of AC frequency using sonometer
6	Characteristics of PN diode
7	Characterization of Zener diode
8	Zener diode as regulator
9	Construction of AND, OR, NOT gates using diodes and transistor
10	NOR gate as a universal building block
11	NAND gate as a universal building block

SEMESTER – III

Course Title:	Modern Indian Language – III Tamil	Course Type: Theory
Course Code: 23LT31		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr. D. Deva Sambath	Dr. R. Josily	Dr. R.S. Rajasree
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	காப்பியங்கள்	2(8), 3(12)	1, 2, 8	U	P
CLO-2	அறிமுகப்படுத்தப்படுவதால் தமிழ்	4(12), 6(8)	1, 2, 7	U	C
CLO-3	மொழியின் உயர்வையும்	2(12), 3(8)	1, 2, 8		
CLO-4	சிறப்பையும் உணர்தல்	5(12), 6(8)	1, 2, 3, 10	E	F
CLO-5	தமிழ் புதினங்களின் வழி சமகாலப் படைப்புகளின் வாழ்வியல் சிந்தனையைப் பெறுவர்	7(12), 8(8)	2, 6, 7, 10	E	C

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	செய்யுள்					
1.1	சிலப்பதிகாரம் -வழக்குரைகாதை	2	1(12)	Lec	MCQ	1
1.2	மணிமேகலை- ஆதிரை பிச்சையிட்ட காதை	2	1(12)	Lec	CA	1
1.3	கம்பராமாயணம் -மந்தரை சூழ்ச்சிப் படலம்	2	1(13)	Sem	SA	1
1.4	சீறாப்புராணம் - புலி	2	1(14)	GD	HOA	1
1.5	வசனித்த படலம்	2	1(12)	Sem	OBT	1
1.6	இரட்சணிய யாத்திரிகம் ஆரணிய பருவம்- விடாத கண்டப்புடலம்	2	1(13)	GL	Ess	1
1.7	பெரியபுராணம்- பூசலார் நாயனார் புராணம்	3	1(14)	GD	CT	1
1.8	அரிச்சந்திர புராணம்- நகரச் சிறப்பு	3	1(14)	Sem	HRA	1
II	நாவல்					
2.1	வெ. இறையன்பு- சாகாவரம்	18	2(100)	Lec	MCQ	1
III	உரைநடை- நெக்கையில்லா தேவதைகள்					
3.1	நெக்கையில்லா தேவதைகள்- அரவாணிகள்	2	3(10)	Lec	SA	2
3.2	இயற்கையின் அதிசயம்	2	3(10)	GD	HrA	2
3.3	கனவுலகம்	2	3(10)	Sem	OBT	2
3.4	அஜ்னபி நாவலும் புலம்பெயர் மக்கள் வாழ்க்கையும்	2	3(10)	Lec	CT	2
3.5	நெஞ்சையள்ளும் சிலம்பு	2	3(10)	GD	ESS	2
3.6	செம்மொழித் தமிழ்	2	3(10)	GL	MCQ	2
3.7	புதுக்கவிதைகளில் வாழ்வியல் பதிவுகள்	2	3(10)	Lec	HOA	2
3.8	நாட்டுப்புற பண்பாட்டில் சடங்குகள்	2	3(10)	Sem	MC	2
3.9	செவி வாயாக நெஞ்சு களனாக	2	3(20)	GD	SA	2
IV	இலக்கணம்					
4.1	யாப்பு (யாப்பின் உறுப்புக்கள் ஆறு)	3	4(17)	Lec	Qui	1
4.2	அணியிலக்கணம்	2	4(11)	Lec	CA	1
	(ஐ) உவமையணி					
	(ஐஐ) தற்குறிப்பேற்றவணி	2	4(11)	GD	HrA	1

	(எ) உருவக அணி	1	4(6)	Sem	OBT	1
	(எ) வேற்றுப்பொருள் வைப்பணி	2	4(11)	Lec	CT	1
	(எ) பின்வருநிலையணி	2	4(11)	GD	Qui	1
	(எ) தீவக அணி	2	4(11)	Sem	MCQ	1
4.3	மொழிப் பயிற்சி	2	4(11)	Lec	Qui	1
4.4	மொழிபெயர்ப்பு	2	4(11)	Sem	SA	1
V	இலக்கிய வரலாறு					
5.1	ஐம்பெருங் காப்பியங்கள்	4	5(20)	Lec	Qui	3,4, 5
5.2	ஐஞ்சிறுகாப்பியங்கள்	4	5(20)	GD	HrA	3,4, 5
5.3	பெரியபுராண சிறப்புகள்	4	5(20)	GD	CA	3,4, 5
5.4	அரிச்சந்திர புராணம்	4	5(20)	Lec	CT	3,4, 5
5.5	நளவெண்பா	2	5(20)	Lec	CT	3,4, 5

BOOKS FOR REFERENCE:

1. பொதுத்தமிழ் -முதற்பருவம், தமிழ்த்துறை வெளியீடு, ஸ்காட் கிறிஸ்தவக் கல்லூரி (தன்னாட்சி), நாகர்கோவில்.
2. நெக்கையில்லா தேவதைகள்ஓ ஜி. ஐசக் அருள்தாஸ்ஓ நியூ செஞ்சுரி பக் ஹவுஸ்ஓ திருநெல்வேலி
3. தமிழ் இலக்கிய வரலாறுஓ சிற்பி. பாலசுப்பிரமணியன்
4. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறுஓ தமிழண்ணல்
5. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறுஓ முனைவர். பாக்யமேரி
6. அமிர்த சாகர் இயற்றிய யாப்பருங்கலக் காரிகைஓ வேங்கடசாமி நாட்டார். கழகப் பதிப்புஓ சென்னை 1997
7. தண்டியலங்காரம் சென்னை. இராமலிங்கதம்பி ரான், கழக வெளியீடு

Course Title:	Modern Indian Language - III Malayalam	Course Type: Theory
Course Code: 23LM31		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr.Jisha.S.K	Prof. Suja S.	Dr.R.Sreejasankar
Ass. Prof. & Faculty Head	Asso. Prof. of Malayalam	Ass. Prof. of Malayalam
+918606520272	+919447218018	+919847909335
jisha@scottchristian.org	sujasdr@gmail.com	sreejavijayan77@gmail.com

CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understanding the visual arts and literature of Kerala and acquiring the ability to act by understanding the difference between characters, dialogues and context	1(5), 2(10),5(5)	1, 2, 3, 8	1,2,3	M, F, C
CLO-2	increased ability to understand and entertained by visual Art	2(10), 3(10)	1, 2, 3, 5	1,2,3	M, C
CLO-3	understand the Linguistic Characteristics of the visual arts of Attakkadha and Tullal	2(5), 5(5), 10(15)	1, 2, 3, 6, 7	1,2	M,P
CLO-4	understands the tradition of drama in details and obtains play writing ability.	9(10), 10(10)	3, 7	1, 9, 10	M, C
CLO-5	Realizing the uniqueness of the screenplay and acquiring writing skills.	1(5), 5(10), 9(5)	1, 2, 3, 8	1,2,3	M, C, P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	Aattakkadha					
1.1	Kadhakaliyude aarambhavum valarchayum	3	1[20]	CS	CT	1
1.2	Pradhaana Attakkadhakriththukal	3	1[20]	GL	CA	1
1.3	Slokaam, Padam, Dandakam	4	1[20]	GD	HrA	1
1.4	Kadhakali chadangukal	4	1[20]	CS	CT	1
1.5	Nalacharitham Aattakkadha randaam Divasam	4	1[20]	GD	HrA	1
II	Thullal					
2.1	Thullalinte Aarambham Valarcha	4	2[25]	GD	HrA	14,15
2.2	Kunchannampyarude Saahithyasambhaavanakal	4	2[25]	CS	CT	14,15
2.3	Saamoohika Vimarsanam Haasyam	5	3[25]	Lec	CA	14,15
2.4	Kalyana Saugandhikam (Enkilo pandu yudhishtiranmuthal dharikka nee	5	3[25]	Lec	CA	14,15

III	Naadakam					
3.1	Malayaala Naadakaththinte Aarambham Valarcha	6	3[35]	Lec	CA	2,3,4,5
3.2	Paaschaththya Naadaka swadheenam	6	3[35]	Lec	CA	2,3,4,
3.3	Kudukka – P.M.Taaj	6	4[30]	GL	CA	2,3,4,
IV	Thirakkadha					
4.1	Thirakkadha yude pothu Khadakangal	6	4[30]	GL	CA	6,7,8,9,10
4.2	Pradhaana Malayaala Thirakkadhaakriththukkal	6	4[35]	GL	CA	6,7,8,9,10
4.3	Oridaththoru Fayalvaan					
V	Cinimayile Puthuvazhikal					
5.1	Documentary, Short films	2	4[10]	GD	HrA	11,12,13
5.2	Webseries	2	4[20]	GD	HrA	11,12,
5.3	Editing Aappukal	2	5[10]	CS	CT	11,12,13
5.4	Chilavukuranja Cinemanirmaanam	2	4[20]	GD	HrA	11,12,13
5.5	YouTube videos	2	4[10]	GD	HrA	11,12,13
5.6	Mobile phone kaalathe Cinema	2	4[10]	GD	HrA	11,12,13
5.7	Nalacharitham Anchaam Divasam - Vinod	3	4[10]	GD	HrA	11,12,13
5.8	Web Series – Karikku	3	5[10]	Lec	ST	11,12,13

BOOKS FOR REFERENCE:

1. Krishna Kaimal Imanam, Aattakadha Sahithyam, Keralabhasha institute, Thiruvananthapuram. 2002
2. Shankarapilla G, Nadakadharshanam, D.C.Books: Kottayam,1990
3. Dr. Vayalavasudevan Pilla (AD), Nadaka Sahityam, Sambhoorna Malayala Sahitya Charitram, current books, Kottayam, 2007.
4. Rajan Thiruvothu, Nadakacharithrathinte kanni Keralabhasha Institute: Thiruvananthapuram,2007.
5. Grama Prakash N. R., Nadakam padavum prayogavum, Keralabhasha institute Thiruvananthapuram 2009
6. Shankarapilla G, Nadakasahithyacharithram, Sathiyapravarthaga Sahakaranasangam: Kottayam,1968

1. Vijaya Krishnan, Chalachitrathinte Porul, Kerala Bhasha institute, Thiruvananthapuram , 2011.

2. Divakaran .R.V.M, Kathayum thirakkathayum DC books, Kottayam .2010
3. Vijaya Krishnan, Chalachitra Sameeksha, Kerala Bhasha institute, Thiruvananthapuram .2011
4. Tony Mathew, M.T . Yude Sarga Prabancham, Keralabhasha institute, Thiruvananthapuram .2013
5. V.K.Joseph, Cinemayum prathayashasthravum, keralasamsarika prasithikaranavagup.
6. Binu Kumar .P.M, Thirakkathayude reethi Sastram,(Compiled and Study) , Kerala Bhasha institute, Thiruvananthapuram , 2011.
7. Raveenthran, Cinema samuham prathayashasthram mathrubhumi books
8. Dr. Jose K. Manuval, kathayam thirakkathaiyum, kairali books, Kannur.
9. George K.M, Aadhunika Malayala sahithya Charithram prasthanagalilode, Kottayam :DC books.
16. George.K.M, Sahithya Charithram prasthanagalilode , Sahithya Pravarthaka sahakarana Sangam,1958

Course Title:	Modern Indian Language – III Hindi	Course Type: Theory
Course Code: 23LH31		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Mrs. Josy Vincent	Dr.Sreedevi S	Dr.Jayasree K.
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josysam2020@gmail.com	sdtvpm@yahoo.com	jayasree8262@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPE WITH CLO	CLO & PLO MAPPE WITH GA	Cognitive Level CL	Knowledge Catogory KC
CLO-1	Apply nuances of letter writing in Hindi	1(10), 5(10)	1, 3, 7	1,2,3	M,F,C
CLO-2	Analyse the rules of official correspondence	1(5), 2(5), 3(10)	1, 2, 3, 5	1,3	F,C
CLO-3	Understand Hindi poetry	5(10), 10(10)	3, 6, 7	1,2,5	M,C
CLO-4	Evaluate the drafting of job application letter	9(10), 10(10)	1, 3, 7	1, 9, 10	M,F,C
CLO-5	Understand official Hindi	9(10), 5(10)	3, 7, 8	1,2,5	C

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	Niji Pathra lekhan					
1.1	Niji PthraLekhan Arth our Bhed	6	1[50]	Lec	CA	1
1.2	Mithr our Bhai ke naam pathr	12	1[50]	GD	ST	1
II	Noukari ke aavedhan Pathr					
2.1	Saamajik Pathr arth our bhedh	9	1[50]	Lec	HoA	1,2
2.2	Avedhan Pathr noukari chutti aadi	9	1[50]	GL	MCQ	1
III	Pracheen Kavithayem					
3.1	Kabeerdas	6	1[35]	GL	CA	2,3
3.2	Rahim	6	1[35]	GL	CA	2,3
3.3	Thulasi das	6	1[30]	GL	CA	2,3
IV	Samakaleena Kavithayem					
4.1	Dhoomil ki kavitha	6	1[35]	GL	CA	2,3
4.2	Kedhaar Nath sing ki kavitha	6	1[35]	GL	CA	2,3
4.3	Sarveshwar Thayaal Saksena ki kavitha	6	1[30]	GL	CA	2,3
V	Aadhika Kavithayem					
5.1	Maidhili saran Gupth ka Nirchar	9	1[50]	GL	CA	2,3
5.2	Mahadevi Varma Ka Kah de maam ab Kya	9	1[50]	GL	CA	2,3

BOOKS FOR REFERENCE:

1. Alekhan our Tipan – Prof Viraj.
2. Aalekhan – Kichlu
3. Kaabya Tharang – Dr. Niranjana

Course Title:	Communicative English - III	Course Type: Theory
Course Code: 23LE31		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr. A. Belinda Asir	Dr. T Sherin	Dr. L. Judith Sophia
Ass. Prof. of English	Asso. Prof. of English	Ass. Prof. of English
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belinda.basewel@yahoo.com	staneytshein@gmail.com	judithsophia24@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	1 (10) 6 (7) 7 (3)	2, 3	U AP	F P
CLO-2	Examine and present material of the prescribed texts and other texts	2 (8) 5 (12)	1, 2	U, An E	C M
CLO-3	Identify cross cutting issues like, Human values, (Professional, Personal and Domestic) ethics and environmental sustainability and practise them	3 (8) 8 (6) 9 (6)	1, 4, 8, 9	An E, Ap	C P
CLO-4	Present and differentiate various cultures and civilizations of the Globe and distinguish Indian traditional Knowledge	1 (10) 8 (5) 10 (5)	5, 6, 10	U, Ap	P M
CLO-5	Relate the textual content and underlying meaning of the context to the real life situations	5 (6) 8 (8) 10 (6)	1, 2, 5, 7	E, Ap, C	C M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	PROSE					
1.1	My London Days (1929) - M. K. Gandhi					
1.1.1	Introduction to the author & the Essay	1	2 [4] 4 [10]	L	Ho A	1
1.1.2	Textual Analysis	2	2[4]	L GD	SA	1
1.1.3	Thematic analysis: Developing responsibility & Human values	3	2 [4], 3[8], 5[10]	L GD	Ass	1
1.2	Shooting an Elephant (1936)- George Orwell					
1.2.1	Introduction to the author & the Essay	1	2 [4] 4 [10]	L	Ho A	1
1.2.2	Textual Analysis	2	2 [4]	L GD	Quiz	1
1.2.3	Human values and Human rights	3	2 [4], 3[5], 5[6]	L GD	Ass	1
1.3	Yes We Can (2008) - Barack Obama					
1.3.1	Introduction to the author & the Essay	1	2 [4] 4 [5]	L	Ho A	1
1.3.2	Textual Analysis	2	2 [4]	L GD	SA	1
1.3.3	Human Values	3	2 [4], 3[5], 5[5]	L GD	Ass	1
II	POETRY					
2.1	A Poison Tree - William Blake					
2.1.1	Introduction to the poet & the poem	1	2[4] 4[5]	L	Ho A	

2.1.2	Poetry Analysis	2	2[4]	L GD	Quiz	
2.1.3	Human Values	2	2 [4], 3[6], 5[6]	L GD	Ass	
2.2	Tear and Smile - Khalil Gibran					
2.2.1	Introduction to the poet & the poem	1	2 [4] 4[7]	L	Ho A	1
2.2.3	Poetry Analysis	2	2[4]	L GD	SA	1
2.2.4	Human Values	2	2 [4], 3[3], 5[3]	L GD	Ass	1
2.3	A Song of Hope- Oodgeroo Noonuccal					
2.3.1	Introduction to the poet & the poem	1	2 [4] 4[5]	L	Ho A	1
2.3.2	Poetry Analysis	2	2[4]	L GD	Essay	1
2.3.3	Human Values	1	2 [4], 3[3], 3]	L GD	Ass	1
2.4	Night of the Scorpion- Nissim Ezekiel					
2.4.1	Introduction to the poet & the poem	1	2 [4] 4[5]	L	Ho A	1
2.4.2	Poetry Analysis	2	2[4]	L GD	Essay	1
2.4.3	Human Values and Indian Ethos - Domestic Values	1	2 [4], 4[3], 3]	L GD	Ass	1
III	SCENES FROM SHAKESPEARE					
3.1	<i>The Merchant of venice</i> Act IV Scene i					
3.1.1	Introduction to Shakespeare and the play	1	2 [4]	L GD	Ho A	1
3.1.2	Character analysis	2	2[4]	L RP	Essay	1

3.1.3	Reflection of Human values (mercy)	3	2[4] 3[10]	TPS	Ass	1
3.2	<i>Othello Act IV Scene ii</i>					
3.2.1	Introduction to the play	1	2 [4]. 4 [5]	L	Ho A	1
3.2.2	Character Analysis Plot and Character analysis	3	2[6]	L RP	Essay	1
3.2.3	Human Values	2	2[6]	L GD	Ass	1
3.3	<i>Julius Caesar Act III Scene ii</i>					
3.3.1	Introduction to the play	1	2[4] 4]	L	Ho A	1
3.3.2	Analysis of the scene	3	2 [4]	L RP	Essay	1
3.3.3	Human Values	2	3[14]5[1]	L GD	Ass	1
IV	LANGUAGE STUDY					
4.1	Grammar: Units 53- 83	18	1[100]	ABL	Ho A	2
V	LANGUAGE IN PRACTICE					
5.1	Vocabulary: Phrases apart from, approve of, bear with, break down, call upon, calm down, carry on, come across, deal with, endowed with, give away, go through, hand over, hold on, look into, look up to, look after, keep on, passed away, put an end to, in vain, inferior to, step down, take over, root out, see through, shut up, side with, try for, wipe out	5	1 [20]	CCC	CT MCQ	3
5.2	Writing Emails		1[10]	P L	Ass	3
5.3	Learning netiquette, email etiquette	3	1[10]	PL	Ass	3
5.4	Messaging in Social Media Platform [blogs, twitter, instagram, facebook] (Experiential Learning- Practical)	4	1[20]	PL	Practical	3
5.5	Data Interpretation and Presentation (Practical)	4	1[10]	PL	Ass	3
5.6	Spoken English (Viva alone)					

BOOKS FOR REFERENCE:

1. *Semester III Prose, Poetry and Drama*. Edited by the Department of English.
2. *Essential English Grammar* by Raymond Murphy. Cambridge University Press
3. *Language in Use: Workbook 111*. Edited by the Department of English

Course Title:	CLASSICAL & QUANTUM MECHANICS	Course Type: Theory
		Course Code: 23GP31
Total Hours: 60	Hours/Week: 4	Credits: 4
Pass-Out Policy :		
Minimum Contact Hours: 36		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. Y. Premila Rachelin	Dr. J.V. Bynaja
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Assi. Prof. of Physics
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achroy66@gmail.com	premlarachelin@gmail.com	bynaja@gmail.com

CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Gain deeper understanding of classical mechanics. Apply the principles of Lagrangian mechanics to solve the equations	2[10] 5[10]	1,2,7,10	R	F, C
CLO-2	Understanding of fundamental concepts in mechanics such as force, energy, momentum etc.	2[10] 5[10]	1,2,7,10	U	P
CLO-3	Explaining the inadequacy of classical mechanics. To learn the fundamental concepts of quantum mechanics.	2[10] 5[10]	1,2,7,10	An	P, M
CLO-4	Apply the Schrodinger wave equations to shown that all particles behave like waves.	2[10] 5[10]	1,2,7,10	Ap, E	F, P
CLO-5	Explain the physical concepts of quantum mechanics. Apply the Schrodinger wave equations to shown that all particles behave like waves.	2[10] 5[10]	1,2,7,10	C	C, M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	LAGRANGIAN FORMALISM					
1.1	Dynamical system, configuration, degrees of freedom – Definition	1	1[10]	Lec	SA	1,2
1.2	Generalised coordinates – Definition and Explanation	1	1[10]	Lec	SA	1,2
1.3	Constraints – Definition and Classification	1	1[10]	Sem	Ess	1,2
1.4	Generalised force in Holonomic system – Derivation	2	1[10]	Lec	SA	1,2
1.5	Principle of virtual work – Statement and Proof	1	1[10]	Lec	Ess	1,2
1.6	D'Alembert's principle – Statement and Proof	1	1[10]	Lec	Ess	1,2
1.7	Lagranges equations for holonomic system	1	1[10]	Lec	Ess	1,2
1.8	Lagranges equation for conservative, non-holonomic system	1	1[10]	Lec	Ess	1,2
1.9	Application of Lagranges equations Application 1: Harmonic Oscillator	1	1[5]	GD	Pro	1,2
1.10	Application 2 : Simple Pendulum	1	1[5]	GD	Pro	1,2
1.11	Application 3 : Motion of particle in space using Cartesian coordinates	1	1[10]	GD	Pro	1,2
II	HAMILTON'S FORMALISM					
2.1	Hamilton's principle – Statement and Explanation	1	2[10]	Lec	SA	1,2
2.2	Derivation of Hamilton's principle from Lagrange's equations	2	2[10]	Ass	Ess	1,2
2.3	Derivation of Lagrange's equations from Hamilton's principle	2	2[10]	Ass	Ess	1,2
2.4	Hamilton's principle (i) Non-conservative, non-holonomic system	2	2[20]	Lec	Ess	1,2
2.5	Euler – Lagrange differential equations	1	2[10]	Lec	Ess	1,2
2.6	Conservation of linear momentum, Conservation of angular momentum,	2	2[20]	Lec	Ess	1,2

2.7	Application 1 : Shortest curve between two points in a plane is a straight line	1	2[10]	GD	Pro	1,2
2.8	Application 3 : Equations of motion of a particle in a conservative field	1	2[10]	GD	Pro	1,2
III	FUNDAMENTALS OF QUANTUM MECHANICS					
3.1	Inadequacy of Classical concepts	1	3[5]	Lec	Ass	2
3.2	Black Body Radiation	1	3[5]	Lec	SA	2
3.3	Specific Heat of Solids	1	3[10]	Lec	Ass	2
3.4	The Photoelectric Effect	1.5	3[15]	Lec	Sem	2
3.5	Compton Effect of X-ray Scattering	1	3[15]	Lec	Ass	2
3.6	The Rutherford Atom Model	2	3[10]	Lec	SA	2
3.7	Bohr's Postulates	1	3[10]	Lec	SA	2
3.8	Bohr's Theory of Hydrogen Spectrum	1	3[10]	Lec	Ess	2
3.9	Stern and Gerlach Experiment	1.5	3[10]	Lec	ESs	2
3.10	Limitations of Old Quantum Theory	1	3[10]	OO	Pro	2
IV	WAVE MECHANICS					
4.1	Introduction	1	4[10]	Lec	SA	2
4.2	DeBroglie's theory of matter waves	1	4[10]	Lec	Pro	2
4.3	Expression for de Broglie wavelength	1	4[10]	GT	Ass	2
4.4	Phase velocity or wave velocity of de Broglie Waves	1	4[10]	Lec	SA	2
4.5	Expression for group velocity,	1	4[10]	GT	Ass	2
4.6	Group velocity of de Broglie waves	0.5	4[10]	Lec	Ess	2
4.7	Relation between group velocity and wave velocity(or) Phase velocity	1	4[10]	GT	Sem	2
4.8	Experimental study of Matter waves- Davisson-Germer experiment	1.5	4[10]	OO	Pro	2
4.9	Heisenberg's uncertainty principle	2	4[10]	Lec	Ess	2
4.10	Problem: Particle in a one dimensional box	1	4[10]	GD	Pro	2
V	QUANTUM MECHANICS					
5.1	Basic postulates of Quantum mechanics	1	5[10]	PT	Qui	2

5.2	Derivation of time dependent form of Schrodinger's wave equation:	1.5	5[15]	PT	Ess	2
5.3	Derivation of time independent form of Schrodinger's wave equation	2	5[10]	PT	Qui	2
5.4	Properties of the wave function	1	5[10]	OO	SA	2
5.5	Expression for probability current density	1	5[10]	OO	Qui	2
5.6	Ehrenfest's theorem	1.5	5[15]	PT	Ess	2
5.7	Eigenfunctions and Eigenvalues, Orthonormal property of wave function	2	5[10]	GT	Ess	2
5.8	Expectation value of a physical quantity	1	5[10]	GT	MCQ	2
5.9	Problem: Linear Harmonic Oscillator	1	5[10]	GD	Pro	2

BOOKS FOR REFERENCE:

1. J.C. Upadhaya, Classical Mechanics, Himalaya Publishing Co. New Delhi
2. P.M. Mathews and K. Venkatesan, 2 nd Edition, The MC Graw-Hill companies, A Textbook of Quantum Mechanics.
3. H. Goldstein, 2002, Classical Mechanics, 3rd Edition, Pearson Edn.
4. C.R. Mondal, Classical Mechanics, Prentice – Hall of India, New Delhi, 2003

Course Title:	NUCLEAR PHYSICS		Course Type:	Theory	
Course Code: 23GP32					
Total Hours: 60	Hours/Week: 4		Credits: 4		
Pass-Out Policy :					
Minimum Contact Hours: 36					
Total Score %: 100		Internal: 40		External: 60	
Minimum Pass %: 40 [No Minimum for Internal]					
Course Creator:		Expert 1:		Expert 2:	
Prof. A. Charles Hepzy Roy		Dr.T.R. Beena		Dr. D.J. Jeejamol	
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achroy66@gmail.com		trbeena@gmail.com		lomajeej@gmail.com	

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge atogory KC
CLO-1	Explain the fundamentals and models of nuclear physics	1[10] 10[10]	1, 2, 3,5,6,7,10	U	F, C

CLO-2	Summarize the theories of decay processes.	1[10] 10[10]	1, 2, 3,5,6,7,10	R	C, P
CLO-3	State the laws of radioactivity. Analyze the reactions involved in fission and fusion.	1[10] 10[10]	1, 2, 3,5,6,7,10	U	P, M
CLO-4	Show the basic knowledge of detectors and accelerators	1[10] 10[10]	1, 2, 3,5,6,7,10	An U	P
CLO-5	Classify the elementary particles and analyse conservation of Charge Parity	1[10] 10[10]	1, 2, 3,5,6,7,10	Ap An	M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I FUNDAMENTALS & MODELS						
1.1	Classification of nucleus	1	1[10]	GD	MCQ	1
1.2	General properties of nucleus	1	1[05]	LEC	QUI	1
1.3	Binding energy	1	1[05]	LEC	SA	1
1.4	Packing fraction	1	1[10]	LEC	SA	1
1.5	Nuclear forces	1	1[05]	GD	SA	1
1.6	Meson theory	1	1[05]	LEC	ESS	1
1.7	Characterization models	1	1[20]	LEC	QUI	1
1.8	Nuclear models-Liquid drop	1	1[05]	LEC	ESS	1
1.9	Semi empirical mass formula	2	1[20]	LEC	ESS	1
1.10	Magic numbers	1	1[10]	LEC	SA	1
1.11	Shell model	1	1[05]	LEC	ESS	1
II RADIOACTIVE RADIATIONS						
2.1	X- ray – properties	1	2[05]	LEC	SA	1
2.2	e/m determination	1	2[05]	LEC	ESS	1
2.3	Range – Bragg apparatus	1	2[15]	LEC	ESS	1
2.4	Geiger – Nuttal law	1	2[10]	LEC	SA	1
2.5	Theory of alpha decay	1	2[10]	LEC	ESS	1
2.6	Beta rays – properties	1	2[20]	GD	SA	1
2.7	X-ray spectra	1	2[05]	LEC	SA	1
2.8	Newton theory of α -decay	1	2[05]	LEC	SA	1
2.9	K-electron capture	1	2[05]	LEC	ESS	1
2.10	Gamma rays – properties	1	2[05]	GD	SA	1
2.11	Nuclear isomerism	1	2[05]	LEC	SA	1
2.12	Internal conversion	1	2[10]	LEC	SA	1
III LAWS OF RADIOACTIVITY, FISSION & FUSION						
3.1	Soddy Fajan’s displacement law	1	3[05]	LEC	SA	1

3.2	Natural radioactive series	1	3[05]	GD	MCQ	1
3.3	Law of radioactive disintegration	1	3[10]	LEC	SA	1
3.4	Half life	1	3[05]	LEC	SA	1
3.5	Mean life	1	3[05]	LEC	SA	1
3.6	Decay constant – Law of radioactive disintegration	1	3[15]	LEC	ESS	1
3.7	Radioactive dating	1	3[05]	GD	SA	1
3.8	Nuclear fission	0.5	3 [05]	LEC	SA	1
3.9	Energy released – chain reaction	0.5	3 [10]	CS	ESS	1
3.10	Multiplication factor	0.5	3 [05]	LEC	MCQ	1
3.11	Critical size	0.5	3 [05]	GD	SA	1
3.12	Nuclear reactor	1	3 [05]	CS	ESS	1
3.13	Nuclear fusion	1	3 [05]	LEC	QUI	1
3.14	Carbon – Nitrogen cycle	0.5	3 [10]	LEC	SA	1
3.15	Proton-Proton cycle	0.5	3 [05]	TPS	SA	1
IV DETECTORS AND ACCELERATORS						
4.1	Ionization chamber	1	4 [10]	LEC	SA	1
4.2	Geiger Muller counter	2	4 [15]	GD	MCQ	1
4.3	Wilson cloud chamber	2	4 [15]	TPS	ESS	1
4.4	Bubble chamber	1	4 [10]	CS	ESS	1
4.5	Scintillation counter	1	4 [10]	LEC	SA	1
4.6	The linear accelerators	1	4 [10]	LEC	MCQ	1
4.7	The cyclotron	2	4 [10]	GD	SA	1
4.8	The Betatron	1	4 [10]	TPS	ESS	1
4.9	The Proton synchrotron	1	4 [10]	LEC	ESS	1
V ELEMENTARY PARTICLES						
5.1	Introduction- Classifications- Baryons	1	5 [05]	LEC	MCQ	1
5.2	Leptons – Mesons	1	5 [10]	GD	SA	1
5.3	Particles and Antiparticles	1	5 [15]	CS	ESS	1
5.4	Antimatter	1	5 [10]	GD	SA	1
5.5	Strong and Weak Interactions	1	5 [05]	LEC	ESS	1
5.6	Electromagnetic – Gravitational Interactions	1	5 [05]	GD	ESS	1
5.7	Baryon Number, Lepton Number	1	5 [10]	CS	SA	1
5.8	Strangeness - Hypercharge	1	5 [10]	LEC	SA	1
5.9	Parity Conservation	1	5 [10]	LEC	MCQ	1
5.10	Charge Conjugation Symmetry	1	5[10]	GD	SA	1
5.11	Time Reversal – CPT Theorem	2	5[10]	TPS	ESS	1

BOOKS FOR REFERENCE:

1. R. Murugesan and Kiruthiga Siva Prakash, Modern Physics, S.Ch and & Compnay Ltd., Ram Nager, New Delhi, 2007

2. Arthur Beiser, Modern Physics; S. Chand and Co., New Delhi, 2007
3. R.R. Roy and B.P. Nigam; Nuclear Physics theory and experiment, New AgeZ International (P) limited, New Delhi, 1996

Course Title:	OPTICS	Course Type: PRACTICAL III
Course Code: 23GPP3		
Total Hours: 30	Hours/Week: 2	Credits: 2
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. Y. Premila Rachelin	Dr. J.V. Bynaja
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Analyze the intensity variation of light due to interference, diffraction and polarization	6[20]	1, 2, 3	An, E	P
CLO-2	They will be able to implement these phenomena to design advanced optical instruments	6[20]	1, 2, 3	An, E	P
CLO-3	Understand the principle, construction and working of lasers in order to implement	6[20]	1, 2, 3	An, E	M
CLO-4	Understand fundamentals of quantum mechanics and apply to one dimensional motion of	6[20]	1, 2, 3	An, E	P
CLO-5	Understand the principle, production and transmission of ultrasonic waves and	6[20]	1, 2, 3	An, E	M

No.	Experiments
1	INTERFERENCE 1. Newton's Rings- Radius of curvature of the given bar. 2. Air-Wedge – To determine the thickness of thin wire.

	3. Elliptical Fringes – To determine the Young’s modulus of glass
2	REFRACTION 1. Spectrometer – To determine dispersive power ω and refractive index μ using solid prism 2. Spectrometer – To determine refractive index of the prism by drawing i-d curve 3. Spectrometer – To determine refractive index of the prism by drawing i-i’ curve
3	DIFFRACTION 1. To determine wavelength of light source using grating in normal incidence position 2. To determine wavelength of light source using grating in oblique incidence position 3. Grating – To determine Resolving power 4. Grating – To determine Dispersive power

Course Title:	SIMPLE HOUSE WIRING	Course Type: PRACTICAL
Course Code: 23PSP1		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. S. Sharmila Juliet	Dr. D. Hudson Oliver
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CLO- No.	Course Learning Outcome Upon completion of this course, students will be able	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Analyze the intensity variation of light due to interference, diffraction and polarization	7[10] 8[10]	1, 2, 5,6,7,9,10	Ap, C	P
CLO-2	They will be able to implement these phenomena to design advanced optical instruments	7[10] 8[10]	1, 2, 5,6,7,9,10	Ap, E	P

CLO-3	Understand the principle, construction and working of lasers in order to implement	7[10] 8[10]	1, 2, 5,6,7,9,10	Ap, C	M
CLO-4	Understand fundamentals of quantum mechanics and apply to one dimensional motion of	7[10] 8[10]	1, 2, 5,6,7,9,10	Ap, E	P
CLO-5	Understand the principle, production and transmission of ultrasonic waves and	7[10] 8[10]	1, 2, 5,6,7,9,10	Ap, C	M

Mod	Section	Description
I	ELECTRICAL WIRING	
	1.	Study circuit of a Simple power supply with regulation & filters.
	2.	Study the circuit and working of a U.P.S.
	3.	Study the circuit and working of a Home Inverter.
	4.	Design and fabricate single phase transformer.
	5.	Study fuses, MCB and important of earthing.
II	ELECTRICAL GADGETS-1	
	1.	Domestic wiring, Megger testing, Clamp testing and fuse testing.
	2.	Assembling and testing of tube light.
	3.	Fault finding of Compact Fluorescent Lamp (CFL).
	4.	Ceiling Fan assembling and testing.
	5.	Wiring connection and testing of electric motor in water pump.
III	ELECTRICAL GADGETS-1I	
	1.	Maintenance and testing of Mixie/Grinder.
	2.	Periodic maintenance and testing of Refrigerator.
	3.	Testing and replacement of coils in Iron box.
	4.	Periodic maintenance and fault finding in Air Conditioner
	5.	Connect different domestic appliances and measure the current wn by them using tong tester.

Course Title: Value Added Course I
Health and Fitness through Yogasanas

Course Type: **Theory**

Total Notional Hours:30 Hours/Week: 2
t: 1

Course Code: **23SE11**

Pass-Out Policy: Minimum Contact Hours: 18
Total Score %:100 Internal: 40 External: 60
Minimum Pass %: 40 [No Minimum for Internal]

Course Creator

Expert I

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CLO- No.	Course Learning Outcomes <i>Upon completion of this course, students will be able to:</i>	% of PLO Mapping with CLO	CLO & PLO Mapped with GA#	Cognitive Level (CL)	Knowledge Category (KC)
CLO-1	analyse their body physically and mentally for the integration of physical, mental and spiritual fitness	2(8), 3(12)	1, 8	U	M
CLO-2	evaluate mental health	2(4), 3(7), 4(5), 6(4)	1, 2, 7	An, Ap	C, P
CLO-3	apply co-ordination in sports	2(2), 3(8), 4(7), 6(3)	1, 2, 7, 8, 10	C	P
CLO-4	understand oneself with basic knowledge about one's personality	2(2), 3(8), 4(7), 6(3)	1, 2, 7, 8, 10	Ap, C	C, P
CLO-5	evaluate themselves and become healthier, saner and more integrated members of the society and of the nation	2(3), 3(9), 4(6), 6(2)	1, 2, 7, 8, 10	An,E	C, F, M

Module	Course Description	Hours	% of CLO Mapping with Module	Learning Activities	Assessments	Reference
1.1	Asanas, Procedure for doing asanas	2	1[33]	Lec	HrA	1
1.2	Asanas in Long sitting position	1	1[17]	BS	Qui	1
1.3	Padmasana, Chin Mudra	1	1[17]	OT	CA	1
1.4	Sugasana, Vajrasana	2	1[33]	Sem	SA	1
2.1	Prone position Asanas	2	2[33]	SI	HoA	2
2.2	Makrasana	1	2[17]	WSQ	CT	2
2.3	Dhanurasana	1	2[17]	FC	CA	2
2.4	Bujankasana	2	2[33]	OO	SA	2
3.1	Supine position Asanas - Sava asana	2	3[33]	TPS	Ess	2
3.2	Sarvaangasana	1	3[17]	KWL	HA	2
3.3	Vibareethakarani	1	3[17]	OO	MCQ	2
3.4	Halasana	2	3[33]	Soc	CA	2
4.1	Standing position Asanas - Thirikonasana	2	4[33]	sSem	HA	3
4.2	Thadasana	1	4[17]	GT	MCQ	3
4.3	Veerapathrasana	1	4[17]	Lec	HrA	3
4.4	Bathahasthasana	2	4[33]	BS	Qui	3
5.1	Kneeling position Asanas	2	5[33]	OT	CA	3

5.2	Mayoorasana	1	5[17]	Sem	SA	3
5.3	Artha sirasana	1	5[17]	SI	HoA	3
5.4	Sirasana	2	5[33]	WSQ	CT	3

Reference Books

1. K. Chandrasekaran, "Sound Health through Yoga" Prem Kaliaan Publication, Sedapatti, 1999.
2. Yogeshwar, "Textbook of Yoga", Madras Yoga Centre, 2004.
3. Kumaresan P. "Yogasanam", Abinaya Publications, 2002.

SEMESTER - IV

Course Title:	Modern Indian Language - IV Tamil	Course Type:	Theory
		Course Code: 23LT41	
Total Hours: 90	Hours/Week: 6	Credits: 3	
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
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CLO- No.	Course Learning Outcome Upon completion of this course, students will be able	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	தொன்மையான தமிழ் இலக்கியங்களின் சிறப்பினை அறிவார்	1(11), 2(9)	1, 2, 3	R	F
CLO-2	கட்டுரைகளின் வழி தமிழறிஞர்களின் சிந்தனைகளைக் கற்றறிவார்	3(8), 4(12)	1, 2, 7, 8	U	C
CLO-3	இலக்கியங்களைத் தமிழர்கள் உருவாக்குவதற்கு வகுத்துள்ள வரை முறைகளை இலக்கணங்கள் வழி அறிந்து கொள்வார்	3(13), 4(7)	1, 2, 7, 8, 10	An	C
CLO-4	தமிழறிஞர்களின் வாழ்வியல், இலக்கிய பணி பற்றி அறிந்த கொள்வார்	5(8), 7(12)	1, 2, 5, 10	U	C
CLO-5	தமிழ் இலக்கியங்களின் வரலாற்றுப் பின்புலத்தை அறிந்து கொள்வார்	1(11), 2(9)	1, 2, 3	R	F

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	செய்யுள்					
1.1	நற்றிணை (10, 14, 16 பாடல்கள்)	2	1(11)	Lec	CA	1
1.2	குறுந்தொகை (16, 17, 19, 20, 25, 29, 38, 44 பாடல்கள்)	3	1(17)	GD	HrA	1
1.3	கலித்தொகை (38, 51 பாடல்கள்)	1	1(6)	Sem	OBT	1
1.4	அகநானூறு (15, 33, 55 பாடல்கள்)	2	1(11)	Lec	CT	1
1.5	புறநானூறு (37, 86, 112 பாடல்கள்)	2	1(11)	GD	Quiz	1
1.6	பரிபாடல் 55 பாடல்	1	1(6)	Sem	MCQ	1
1.7	நெடுநல்வாடை முழுவதும்	7	1(38)	GL	SA	2
II	உரைநடை					
2.1	கல்வி அழகே அழகு -மயில்வாகனன்	2	2(11)	Lec	CA	4
2.2	பரிமேலழகர் த. இயேசு தாஸ்	2	2(11)	GD	HrA	4
2.3	பரிசில் வாழ்க்கை-மு. வரதராசன்	2	2(11)	Sem	OBT	4
2.4	குறள் விளக்கம்- வ.சு.ப. மாணிக்கம்	2	2(11)	GL	CT	4
2.5	தலைமைப் பொறுப்பு -அகிலன்	2	2(11)	GD	Quiz	4
2.6	நகைச்சுவைப் பாடல்கள் - ஜே. ரோஸ்லெட் டானிபாய்	2	2(11)	Lect	HOA	3
2.7	சுற்றுப்புறச் சூழல்- தே. தேவசம்பத்	2	2(11)	GD	SA	3
2.8	சமய நல்லிணக்கம் கு.வெ. பாலசுப்பிரமணியன்	2	2(11)	Sem	MCQ	4
2.9	விருந்தோம்பல் கி. இராசா	2	2(12)	GL	Ess	4
III	வாழ்க்கை வரலாறு					
3.1	கல்வித் தந்தை காமராஜர் முனைவர் - ப. பாலசுப்பிரமணியன்	18	3(100)	GD	CT	6
IV	இலக்கணம்					
4.1	அகப்பொருள் இலக்கணம்	4	4(22)	Lec	CA	1

4.2	அகப்பொருள் துறைகள் 1. அறத்தொடு நின்றல் (48) 2. வரைவு கடாதல் (165) 3. உடன்போக்கு (180) 4. பிரிவு (62) 5. பாங்கியிற் கூட்டம் வகை மடற் கூற்றும் மடல்விலக்கும் (145)	4	4(22)	Lec	CA	1
4.3	புறப்பொருள் இலக்கணம்	4	4(22)	Sem	OBT	1
4.4	புறப்பொருள் துறைகள் வெட்சிப்படலம் 1. விரிச்சி 2. செலவு 3. பாதீடு 4. உண்டாட்டு 5. வெறியாட்டு	4	4(22)	Sem	OBT	1
4.5	6. போர் மலைதல் 7. புண்ணொடு வருதல் 8. பிள்ளைத் தெளிவு 9. பிள்ளையாட்டு 10. நெடுமொழி கூறல்	3	4(17)	Lec	CT	1
V	இலக்கிய வரலாறு					
5.1	சங்க வரலாறு	4	5(22)	Lec	MCQ	1
5.2	சங்கம் இருந்தமைக்கான சான்றுகள்	4	5(22)	Sem	SA	1
5.3	எட்டுத்தொகை நூல்கள்	5	5(27)	GD	Ess	1
5.4	பத்துப்பாட்டு நூல்கள்	5	5(29)	GL	CT	1

BOOKS FOR REFERENCE:

1. சங்க இலக்கியம்இ எட்டுத்தொகைஇ முனைவர் வி. நாகராசன் (உ.ஆ)இ நியு செஞ்சுரி புக ஹவுஸ் சென்னை 600 098.
2. சங்க இலக்கியம்இ பத்துப்பாட்டுஇ முனைவர் வி. நாகராசன் (உ.ஆ)இ நியு செஞ்சுரி புக ஹவுஸ் சென்னை 600 098
3. மணிச்சிகைஇ ஜே.ஜி. என் டாசன் (தொ. ஆ)இ தமிழாய்வு மையம்இ ஸ்காட் சிறிஸ்தவக் கல்லூரிஇ நாகர்கோவில் -3
4. பொதுத்தமிழ் (நான்காம் பருவம்)இ தமிழ்த்றை வெளியீடுஇ ஸ்காட் சிறிஸ்தவக் கல்லூரிஇ நாகர்கோவில் 2024
5. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறுஇ முனைவர் பாக்ய மேரிஇ நியு செஞ்சுரி புக ஹவுஸ் சென்னை - 600 098.
6. கல்வித் தந்தை காமராஜர்இ முனைவர் ப. பாலசுப்பிரமணியன்இ நியு செஞ்சுரி புக ஹவுஸ் (பி) லிட்.இ சென்னை -600 050.
7. தமிழ் இலக்கிய வரலாறு சிற்பி. பாலசுப்பிரமணியன்
8. இராஜகோபாலாச்சாரியார்இ கே.இ அணியியல்இ கண்ணப்பன் பதிப்பகம்இ தி.நகர்இ சென்னை.

Course Title: Modern Indian Language - IV Malayalam	Course Type: Theory	
Course Code: 23LM41		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand the history and necessity of Printing	1(10), 2(10)	1, 2, 3, 8	1,2,3	M, F, C
CLO-2	Understand the linguistic features of Media	2(5), 3(5),5(10)	1, 2, 3, 5	1,2,3	M, C
CLO-3	Understand different idioms and features of sentences	2(5), 9(10), 10(5)	1, 3, 7	1,2	M, C, P
CLO-4	Understand the compositional features of official writing and acquire writing skills.	9(10), 10(10)	3, 7, 8	1, 9, 10	M, C, P
CLO-5	Analyse social responsibility by learning essay writing based on social and cultural issues.	1(5), 5(10), 9(5)	1, 2, 8	1,2,3	M, C, P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	Achadi					
1.1	Achadiyude Valarcha, Parinaamam	2	1[15]	GL	Qui	8
1.2	Pressukal	3	1[15]	GT	HrA	8
1.3	Pathramaasikakal	2	1[15]	Lec	CT	8

1.4	Vidyavinidini	3	1[15]	Lec	ST	8
1.5	Rasikarenjini	3	1[15]	GL	Qui	8
1.6	Jnananikhepam	3	1[15]	GT	HrA	8
1.7	Kavanakaumudi	2	1[10]	Lec	CT	8
II	Maadhyamabhaasha					
2.1	Kambyutting	4	2[30]	GL	OBT	6
2.2	Word document	4	2[30]	GD	HrA	6
2.3	Malayalam DTP cheyyunnavidham	10	2[40]	Lec	CT	6
III	Bhaashayum Prayogavum					
3.1	Padasudhi	4	3[25]	Lec	OBT	7
3.2	Samgrahanam	4	3[25]	GL	CA	7
3.3	Aasayavipulanam	5	3[25]	GD	HrA	7
3.4	Vaakyarachana	5	3[25]	CS	Qui	7
IV	Vividhatharam Ezhuththukal					
4.1	Jolikkuvendiyulla Apekhakal	3	4[15]	Lec	CA	1,2
4.2	Suparsakkaththukal	3	4[15]	GL	OBT	1,2
4.3	Abhiprayamchodikkal	3	4[10]	Ess	HrA	1,2
4.4	Sarkkular	3	5[10]	Sp	CT	1,2
4.5	Vaaniyyakkaththukal	2	5[10]	Lec	Ess	1,2
4.6	Memorandum	2	5[20]	Lec	HoA	1,2
4.7	Nivedanam	2	5[20]	Lec	CA	1,2
V	Upanyasa Rechana					
5.1	Upanyasa Rechana Reethi	2	5[20]	Sp	CT	4
5.2	Paristhithi vidyabhyaasam	4	5[20]	Lec	Ess	4
5.3	Keraleeya Kalakal	4	5[20]	Lec	HoA	4
5.4	Pusthaka Paaraayanam	4	4[20]	Ess	HrA	4
5.5	Bharanabhaasha Malayalam	4	5[20]	Sp	CT	4

BOOKS FOR REFERENCE:

1. George K.M, Aadhunika Malayala sahithya Charithram prasthanagaliloode, Kottayam :DC books, 1998.
2. George.K.M, Sahithya Charithram Prasthanagaliloode , Sahithya Pravarthaka Sahakarana Sangam Kottayam,1958
3. Krishna Pilla .N, Kairaliyude Katha, DC Books, Kottayam ,1958.
4. Rajendran , Upanyasanrachna, Sahitya Pravarthaga Sahakarana Sangam, Kottayam ,1997.
5. //ml.wikibooks.org/wiki/Malayalam_Computing
6. Gadyasilpam, C.V.Vasudeva Bhattathir,i Keralabkasha Institute, 1998
7. Malayalappacha ,Research Journal, vol – 7, no. 7, 2018

EMESTER – IV

Course Title:	Modern Indian Language – IV Hindi	Course Type: Theory
Course Code: 23LH41		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Mrs. Josy Vincent	Dr.Sreedevi S	Dr.Jayasree. K.
Ass. Prof. of Hindi	Ass. Prof. of Hindi	Ass. Prof. of Hindi
+9486357323	+919495243814	+919539204383
josysam2020@gmail.com	sdtvpm@yahoo.com	jayasree8262@gmail.co

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand the history of modern Kavitha	1(10), 2(10)	1,2, 3, 6, 8	1,2,3	M, C
CLO-2	Understand the value and Beauty of Modern Poetry	1(5), 2(10), 5(5)	1, 2, 3, 6	1,3	M,F
CLO-3	Evaluate history of short Epic	5(10), 9(10)	6, 7	1,2,5	M,P
CLO-4	Understand the usage of Chand our Alankaar in Poetry.	9(10), 10(10)	1, 3,7	1, 9, 10	M,F, C
CLO-5	Evaluate and gain knowledge about Translation	9(10), 5(10)	1, 7	1,2,5	M, C, P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	Aadhunika Kavitha					
1.1	Aadhunik kavitha ke bare mem, kaviyom ke mem	9	1[50]	Lec	CA	1,2,3
1.2	Gajanan Madhav Mukthi Bodh Kaa O Megh	9	1[50]	Lec	CA	1,2,3
II	Khanda Kavya					
2.1	SreeNaresh Mehtha nakak kavi ka Parichay	2	2[20]	GD	ST	5
2.2	Sabari ki Kahani	2	2[10]	Lec	OT	5
2.3	Thretha - adhyayan	2	2[10]	Sem	OBT	5
2.4	Pampasar - Adhyayan	3	3[20]	Lec	Qui	5
2.5	Thapasya - adhyayan	3	3[20]	Lec	HoA	5
2.6	Pareeksha - Adhyayan	3	3[10]	GL	MCQ	5
2.8	Dharshan - Adhyayan	3	4[10]	GD	SA	5
III	Chand					
3.1	Chand Parichay	2	2[20]	Sem	OBT	4
3.2	Dhoha Chand Vishadeekaran	4	3[20]	Lec	Qui	4
3.3	Sorata chand Vishadeekaran	4	3[20]	Lec	HoA	4
3.4	Indhravajra - Vishadeekaran	4	3[20]	GL	MCQ	4
3.5	Maalini - Vishadeekaran	4	4[20]	GD	SA	4
IV	Alankaar					
4.1	Ardhaalankaar, shabdhalankaar, ayalankar	2	2[20]	Sem	OBT	4
4.2	Anupras Alankaar	4	3[20]	Lec	Qui	4
4.3	Yamak Alankaar	4	3[20]	Lec	HoA	4
4.4	Upama Alankaar	4	3[20]	GL	MCQ	4
4.5	Roopak Alankaar	4	4[20]	GD	SA	4
V	Anuvad					
5.1	Anuvad Ka Swaroop	2	2 (20)	Sem	OBT	4

5.2	Anuvad Vinjan Ya Kala	4	3 (20)	Lec	Qui	4
5.3	Anuvad Ki Prakriya	4	3 (20)	Lec	HoA	4
5.4	Anuvad Prayogikatha	4	3 (20)	GL	MCQ	4
5.5	Anuvad Abhyas	4	4 (20)	GD	SA	4

BOOKS FOR REFERENCE:

1. Kaavya Tarang – Dr. Niranjan
2. Aadhunik Hindi Kaavya our Kavi – Dr. Ramchandra thivaari
3. Aadhunik Hindi Kavitha – Vivid Aayam
4. Hindi vyakaran : ras, Chand, alankaar Sahith – 2019, Umesh Chandra Shulk, Hindi Sansthan, Nayidilli
5. Sabari – Sri Naresh Mehtha

Course Title:	Communicative English - IV	Course Type: Theory
Course Code: 23LE41		
Total Hours: 90	Hours/Week: 6	Credits: 3
Pass-Out Policy: Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Dr. Sheni D. L. Singh	Dr. A. Belinda Asir	Dr. L. Judith Sophia
Ass. Prof. of English	Ass. Prof. of English	Asso. Prof. of English
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shenisingh1984@gmail.com	belinda.basewel@yahoo.com	judithsophia24@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	1 (10) 6 (7) 7 (3)	2, 3	U AP	F P
CLO-2	Examine and present material of the prescribed texts and other texts	2 (8) 5 (12)	1, 2	U, An E	C M
CLO-3	Identify cross cutting issues like, Human values, (Professional, Personal and Domestic) ethics and environmental sustainability and practise them	3 (8) 8 (6) 9 (6)	1, 4, 8, 9	An E, Ap	C P

CLO-4	Present and differentiate various cultures and civilizations of the Globe and distinguish Indian traditional Knowledge	1 (10) 8 (5) 10 (5)	5, 6, 10	U, Ap	P M
CLO-5	Relate the textual content and underlying meaning of the context to the real life situations	5 (6) 8 (8) 10 (6)	1, 2, 5, 7	E, Ap, C	C M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	PROSE					
1.1	Mother Teresa - John Frazer					
1.1.1	Introduction to the Author and the essay	1	2 [4], 4 [10]	L	Ho A	1
1.1.2	Textual Analysis	2	2 [4]	L GD	SA	1
1.1.3	Human Values in "Mother Teresa"	3	2 [4], 3[10], 5[7]	L GD	Ass	1
1.2	Anancy- Andrew Salkey					
1.2.1	Introduction to the Author and the essay	1	2 [4], 4 [10]	L	Ho A	1
1.2.2	Textual Analysis	2	2 [4]	L GD	Quiz	1
1.2.3	Reflection of Human Values in "Anancy"	3	2 [4], 3[5], 5[7]	L GD	Ass	1
1.3	Dangers of Drug Abuse- Hardin B. Jones					
1.3.1	Introduction to the Author and the essay	1	2 [4], 4 [5]	L	Ho A	1
1.3.2	Textual Analysis	2	2 [4]	L GD	SA	1
1.3.3	Human Values in "Dangers of Drug Abuse"	3	2 [4], 3[5], 5[5]	L GD	Ass	1

II		POETRY				
2.1	Ode to the West Wind- P. B. Shelley i					
2.1.1	Introduction to the poet & the poem	1	2 [4] 4[3]	L	Ho A	1
2.1.2	Poetry Analysis	2	2[4]	L GD	Ess	1
2.1.3	Human Values reflected in “Ode to the West Wind”	1	2 [4], 3[3], 5[5]	L GD	Ass	1
2.2	The Lotus- Toru Dutt					
2.2.1	Introduction to the poet & the poem	1	2 [4] 4[5]	L	Ho A	1
2.2.3	Poetry Analysis	2	2[4]	L GD	Ess	1
2.2.4	Expressions of Indian Ethos in “The lotus” and cultural exchange between East and West	1	2 [4], 4[5], 5[4]	L GD	Ass	1
2.3	Once Upon a Time -Gabriel Okara					
2.3.1	Introduction to the poet & the poem	1	2 [4] 4[5]	L	Ho A	1
2.3.2	Poetry Analysis	2	2[4]	L GD	Ess	1
2.3.3	Human Values in “Once Upon a Time”	1	2 [4], 3[3], 5[3]	L GD	Ass	1
2.4	Be the Best of Whatever You are- Douglas Malloch					
2.4.1	Introduction to the poet & the poem	1	2 [4] 4[5]	L	Ho A	1
2.4.2	Poetry Analysis	2	2[4]	L GD	Ess	1
2.4.3	Human Values reflected in “Be the Best of Whatever You are”	1	2 [4], 3[6], 5[5]	L GD	Ass	1
III		ONE ACT PLAYS				
3.1	A Marriage Proposal - Anton Chekov					
3.1.1	Introducing the author and the play	1	2 [4]. 4 [5]	L	Ho A	1
3.1.2	Character and plot analysis	3	2[4]	L RP	Ess	1

3.1.3	Wealth, Love and Marriage in "A Marriage Proposal"	2	2[4] 5[10]	L GD	Ass	1
3.2	A Bishop's Candlesticks - Norman McKinnel					
3.2.1	Introducing the author and the play	1	2 [4]. 4 [5]	L	Ho A	1
3.2.2	Character and plot analysis	3	2[9]	L RP	Ess	1
3.2.3	Human Values in "A Bishop's Candlesticks"	2	2[8]	L GD	Ass	1
3.3	Chitra - Rabindranath Tagore					
3.3.1	Introduction to Tagore and the play	1	2 [8]. 4 [5]	L	Ho A	1
3.3.2	Textual analysis and character analysis	3	2[4]	L RP	Ess	1
3.3.3	Human Values reflected in "Chitra"	2	2[10] 3[10]	L GD	Ass	1
IV	LANGUAGE STUDY					
4.1	Grammar: Units 84-114	18	1[100]	ABL	CT	2
V	LANGUAGE IN PRACTICE					
5.1	Vocabulary: Idioms 1. To smell a cat 2. To kill two birds with one stone 3. To cut a sorry figure 4. Gift of the gab 5. In the family way 6. To fish in troubled waters 7. Spick and span 8. Maiden speech 9. Through thick and thin 10. Beat around the bush 11. Elephant in room 12. Out of the blue 13. By hook or crook 14. A wolf in sheep's clothing 15. Between the devil and the deep sea 16. Better late than never 17. Blessing in disguise 18. Add fuel to the fire 19. Go the extra mile 20. Don't cry over spilled milk 21. Read between the lines 22. Turn a deaf ear 23. Look before you leap 24. Pour one's heart out 25. Pull one's leg 26. Break the ice 27. To bell the cat 28. Face the Music 29. Come out with flying colours 30. At face value	4	1[10]	ABL	CT	3

5.2	Job Applications, Covering Letters, CV & Resume	4	1[20]	ABL	Ass	3
5.3	Circular, Notice, Agenda and Minutes	4	1[10]	ABL	Ass	3
5.4	Interview Etiquettes (Practical skills in Interviews -body language)- face to face - telephone and video conferencing)	2	1[20]	ABL	Viva	3
5.5	Power Point preparation (Practical)	2	1[10]	ABL	Ass	3
5.6	Creating a Digital Profile- LinkedIn (Practical)	1	1[20]	ABL	Ass	3
5.7	Spoken English (Practical) Making suggestions & Responding to suggestions, Asking for and giving Advice or Help	1	1[10]	RP	Viva	3

BOOKS FOR REFERENCE:

1. *Prose, Poetry and One Act Plays*. Edited by the Department of English.
2. *Essential English Grammar* by Raymond Murphy. Cambridge University Press
3. *Language in Use: Workbook 1V*. Edited by the Department of English.

Course Title:	ELECTRICITY AND MAGNETISM	Course Type: Theory
Course Code: 23GP41		
Total Hours: 60	Hours/Week: 4	Credits: 4
Pass-Out Policy :		
Minimum Contact Hours: 36		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy	Dr. Y. Premila Rachelin	Dr. J.V. Bynaja
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Ass. Prof. of Physics
+919944261881	+919489620591	+919444384135
achroy66@gmail.com	premlarachelin@gmail.com	bynaja@gmail.com

CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Define and explain the fundamental concepts of electromagnetism.	1[10] 2[10]	1,2,3	R	F, C
CLO-2	Explain the basic electric and magnetic interactions. Build Knowledge and interpret experimental data to examine the basic physics laws.	1[10] 2[10]	1,2,3	U, Ap	F, P
CLO-3	Analyse and solve problems with the aids of Mathematics. Apply the principles of algebra and trigonometry to electricity and magnetism.	1[10] 2[10]	1,2,3	U, Ap	C, P
CLO-4	Demonstrate about similarities and differences between the electric and magnetic systems.	1[10] 2[10]	1,2,3	An	P
CLO-5	Determine the significance of steady current, Alternating current, thermoelectricity, Magneto statics and magnetic properties of matter.	1[10] 2[10]	1,2,3	An,	M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	MAGNETIC EFFECT OF ELECTRIC CURRENT					
1.1	Magnetic flux and magnetic induction	1	1[5]	Lec	Quiz	1
1.2	Biot Savart law	0.5	1[5]	GD	SA	1
1.3	Magnetic induction at a point due to a straight conductor carrying current	1	1[10]	Lec	Ess	1
1.4	Magnetic induction at a point on the axis of a circular coil carrying current	1	1[10]	Lec	Ess	1
1.5	Ampere's circuital law	0.5	1[5]	GT	Ass	1
1.6	Magnetic field inside a long solenoid	1	1[10]	Lec	Ess	1
1.7	Magnetic field toroid	1	1[10]	Lec	Ess	1
1.8	Lorentz force on a moving charge	1	1[10]	TPS	SA	1

1.9	Direction of force	1	1[5]	BS	SA	1
1.10	Torque on a current loop in a uniform magnetic field	1.5	1[10]	Lec	Ess	1
1.11	Moving coil Ballistic galvanomete - theory	1	1[10]	Lec	Ess	1
1.12	Experiment to find charge sensitivity and absolute capacity of a capacitor	1.5	1[10]	EL	Ess	1
II	THERMAL AND CHEMICAL EFFECT OF ELECTRIC CURRENT					
2.1	Thermoelectricity- Seebeck effect	1	2[15]	Lec	SA	1,2
2.2	Laws of thermo e.m.f	1.5	2[15]	Lec	SA	1,2
2.3	Measurement of thermo e.m.f using potentiometer	1.5	2[10]	EL	Ess	1,2
2.4	Peltier effect-demonstration	1.5	2[5]	Lec	SA	1,2
2.5	Thomson effect- demonstration	1.5	2[10]	Lec	SA	1,2
2.6	Thermodynamics of thermo couple	1	2[10]	Lec	Ess	1,2
2.7	Uses-Applications-Thermopile- Boy's radio micrometer	1	2[10]	GT	SA	1,2
2.8	Faradays laws of electrolysis	1	2[5]	GD	SA	1,2
2.10	Electrical conductivity of an electrolyte	1	2[10]	Lec	Ess	1,2
2.11	Specific conductivity- Kohlrausch's bridge method of determining the specific conductivity of an electrolyte	1	2[10]	Lec	Ess	1,2
III	ELECTROMAGNETIC INDUCTION					
3.1	Faraday's laws of electromagnetic induction	1	3[5]	GT	SA	1,3
3.2	Self-induction	1	3[5]	GD	Quiz	1,3
3.3	Self-inductance of a long solenoid	1.5	3[10]	Lec	Ess	1,3
3.4	Self-inductance of a toroidal solenoid	1.5	3[10]	Lec	Ess	1,3
3.5	Determination of L by Anderson's and Rayleigh's methods-Owen's bridge	1	3[10]	Lec	Ess	1,3
3.6	Mutual induction	1	3[5]	TPS	Ass	1,3
3.7	Mutual inductance between two co-axial solenoids	1	3[10]	Lec	Ess	1,3
3.8	Experimental determination of mutual inductance	1	3[10]	ET	Ess	1,3

3.9	Co-efficient of coupling	1	3[5]	Lec	Ess	1,3
3.10	Eddy current	1.5	3[10]	Lec	Sem	1,3
3.11	Uses Earth inductor-uses-search coil	1.5	3[10]	GD	SA	1,3
3.12	Induction coil and its uses	1	3[10]	Lec	SA	1,3
IV	AC AND DC CIRCUITS					
4.1	Alternating Current	0.5	4[5]	GD	Quiz	1
4.2	j operator method- Use of j operator in the study of AC circuits	1	4[10]	Lec	Ass	1
4.3	Resistance, Inductance, Capacitance in an AC circuit	1	4[10]	Lec	SA	1
4.4	AC through an inductance and resistance in series	1	4[5]	Sem	SA	1
4.5	Capacitance and resistance in series	0.5	4[5]	Sem	SA	1
4.6	LCR series resonance circuit- Sharpness of resonance	1	4[10]	Lec	SA	1
4.7	Parallel resonance circuit	1	4[10]	Lec	Ess	1
4.8	Power in an AC circuit-power factor	1	4[10]	Lec	Ess	1
4.9	Growth and decay of current in LC, LR and CR circuits with DC voltages	1	4[10]	Lec	Ess	1
4.10	Determination of high resistance by leakage	1	4[5]	EL	SA	1
4.11	Growth and decay of charge in LCR circuit	1	4[10]	Lec	SA	1
4.12	Conditions for the discharge to be oscillatory -frequency of oscillation	1	4[10]	Lec	Ess	1
V	MAXWELL'S EQUATION & ELECTROMAGNETIC WAVES					
5.1	Introduction	1	5[5]	Lec	Quiz	1,3
5.2	Maxwell's equations	1.5	5[10]	GD	SA	1,3
5.3	Displacement current	1.5	5[5]	Lec	SA	1,3
5.4	Poynting vector	1	5[20]	Lec	Ess	1,3
5.5	Electromagnetic waves in free space	1	5[5]	GT	Ass	1,3
5.6	Hertz experiment for production and detection of EM waves	1	5[10]	TPS	SA	1,3
5.7	Wave equations for Electric field and Magnetic field	1	5[10]	Lec	Sem	1,3

5.8	Monochromatic plane waves	1	5[5]	GT	Quiz	1,3
5.9	EM waves in a matter	1	5[10]	Lec	Ess	1,3
5.10	Reflection and Transmission at normal incidence and oblique incidence	1	5[20]	Lec	Ess	1,3

BOOKS FOR REFERENCE:

1. R. Murugesan, Electricity and Magnetism, (2008), S Chand & Co, New Delhi.
2. BrijLal & Subramanyam, Electricity and Magnetism, (2005), Ratan Prakashan Mandir Publishers, Agra.
3. M. Narayanamurthy & N. Nagarathnam, Electricity & Magnetism, NPC pub., revised edition.
4. D.N. Vasudeva, Electricity and Magnetism, Twelfth revised edition.
5. K.K. Tiwari, Electricity and Magnetism, S. Chand & Co.
6. E.M. Pource, Electricity and Magnetism, Berkley Physics Course, vol. 2 Mc Graw-Hill.
7. Tayal, Electricity and Magnetism, Himalalaya Publishing Co.
8. D. Halliday, R. Resnick and J. Walker, Fundamentals of Physics – Electricity and Magnetism, (2011), Wiley India, Pvt Ltd.
9. David J. Griffith, Introduction to Electrodynamics, (2012) PHI, New Delhi.

Course Title:	ELECTRICITY AND MAGNETISM	Course Type: Practical - IV
Course Code: 23GPP4		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy :		
Minimum Contact Hours: 18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. Y. Premila Rachelin	Dr. J.V. Bynaja
Asso. Prof., Faculty Head	Asso. Prof. Physics	Ass. Prof. of Physics
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Construct circuit's to learn about the concept of electricity and magnetism with different parameter that affect the circuit.	6[20]	1, 2, 3	An, E	P
CLO-2	Study the electric field using coloumbs inverse square law in electrostatics of current	6[20]	1, 2, 3	An, E	P

CLO-3	Analyse the chemical, heating effect of current and analyse the relations between b, h and m	6[20]	1, 2, 3	An, E	M
CLO-4	Understand the faradays laws of electromagnetic induction by rayleigh's method	6[20]	1, 2, 3	An, E	P
CLO-5	Analyse the value of maxwell equation-boundary conditions	6[20]	1, 2, 3	An, E	M

No.	Course Description
1	Calibration of low/high range voltmeter using potentiometer
2	Calibration of Ammeter using potentiometer
3	Measurement of low resistance using potentiometer
4	Determination of M & B_H - Deflection and vibration Magnetometer- Tan A, Tan B
5	Earth's magnetic field using field along axis of current carrying coil
6	Determination of specific resistance of the material of the wire using PO Box
7	Determination of resistance and specific resistance using Carey Foster's bridge
8	Series Resonance Circuit
9	Parallel resonance Circuit
10	Determination of emf of thermo couple using potentiometer
11	Determination of M & B_H - Deflection and vibration Magnetometer- Tan C
12	Hall Effect - Hall voltage, Hall coefficient
13	Magnetic Susceptibility - Quincke's Method

SEMESTER - IV

Course Title:	ELECTRICAL TECHNOLOGY	Course Type: Theory & Practical
Course Code: 23PSP2		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy :		
Minimum Contact Hours: 18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. S. Sharmila Juliet	Dr. D. Hudson Oliver
Asso. Prof., Faculty Head	Assi. Prof. of Physics	Assi. Prof. of Physics
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achroy66@gmail.com	sharmilabennet@gmail.com	hudson2612@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Learn about the basic concepts for the construction and design of D.C. motor and their characteristics.	7[10] 9[10]	1,2,4,5,7,9	R, E	P
CLO-2	Develop skills about the construction of Transformers, types of losses in them and to get a knowledge to increase efficiency	7[10] 9[10]	1,2,4,5,7,9	U,Ap	P
CLO-3	Gain knowledge about induction motors, their types regarding the rotor types and how is it related to a generator	7[10] 9[10]	1,2,4,5,7,9	R, Ap	P
CLO-4	Learn about various types of single phase and three phase induction motors and the starting techniques of induction motor	7[10] 9[10]	1,2,4,5,7,9	U,An	P
CLO-5	Understand the basic concepts and various principles involved in air conditioning	7[10] 9[10]	1,2,4,5,7,9	U,An	P

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	DC MOTOR					
1.1	D.C. Motors - Principle	0.5	1[5]	Lec	Qui	1
1.2	Significance of back e.m.f.	1	1[10]	Lec	Ass	1
1.3	Voltage equation of a motor- Condition for max	1	1[15]	CS	MCQ	1
1.4	Armature Torque and Shaft Torque	1	1[5]	BS	Qui	1
1.5	Speed of a D.C. motor – Speed regulation	1	1[15]	TPS	Ass	1
1.6	Characteristics of a Series motor	1	1[10]	GD	SA	1
1.7	Characteristics of a shunt motor	0.5	1[15]	Lec	SA	1
II	TRANSFORMER					
2.1	Transformer – Working principle	0.5	2[5]	Lec	MCQ	1
2.2	Elementary theory of an ideal transformer	1	2[5]	GD	Qui	1

2.3	E.M.F. equation of a transformer – voltage transformation	1	2[10]	Lec	SA	1
2.4	Magnetic leakage in Transformer	1	2[20]	TPS	Ess	1
2.5	Transformer losses on load	1	2[10]	CS	Ass	1
2.6	Efficiency and condition for maximum efficiency	0.5	2[10]	BS	Ass	1
2.7	Three phase Transformer	1	2[10]	Lec	Ess	1
2.8	Star/star connection & delta-delta connection	1	2[10]	EL	Ess	1
III	INDUCTION MOTOR					
3.1	Induction Motor – Classification – principle of operation	1	3[10]	Lec	Qui	1
3.2	Construction of an induction motor	1	3[10]	Lec	Ess	1
3.3	Squirrel cage Rotor	1	3[5]	TPS	Ass	1
3.4	Phase wound Rotor	1	3[10]	CS	Ess	1
3.5	Production of a rotating magnetic field	1	3[5]	Lec	SA	1
3.6	Slip	0.5	3[10]	EL	MCQ	1
3.7	Starting Torque	0.5	3[10]	BS	Qui	1
3.8	Induction motor running as a generator	1	3[10]	GD	Ess	1
IV	SYNCHRONOUS MOTOR					
4.1	Single phase motor – induction motor	1	4[5]	Lec	Ass	1
4.2	Synchronous motor - principle	0.5	4[10]	EL	Ess	1
4.3	Starting of a synchronous motor	1	4[10]	TPS	Ess	1
4.4	Power flow within a synchronous motor	1	4[5]	Lec	SA	1
4.5	Comparison between an induction motor and a synchronous motor	0.5	4[10]	CS	Ess	1
V	COOLING DEVICES					
5.1	Air Conditioning Principles of heat transfer, Conduction, Convection and Radiation.	1	5[5]	Lec	SA	2
5.2	Condensers - Air cooled and water cooled,	1	5[5]	OO	Ass	2
5.3	Heat Rejected in condensers	0.5	5[5]	Lec	Ass	2
5.4	Purging	0.5	5[5]	BS	Qui	2
5.5	Types of expansion devices and sensible heat factor	0.5	5[20]	CS	Ess	2
5.6	Evaporators - Dry and flooded	1	5[5]	TPS	MCQ	2
5.7	Refrigerants, their properties and nomenclature	1	5[10]	Lec	Ess	2

5.8	Working principle of an air conditioner	0.5	5[20]	GD	Ess	2
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BOOKS FOR REFERENCE:

1. B.L. Theraja, A.K. Theraja 2003, A Text book of Electrical Technology vol II, 3rd edition, S. Chand & Company LTD, Ram Nagar, New Delhi, India
2. J.K. Gupta 2015, A Text book of Air conditioning & Refrigeration, S. Chand & Company LTD, Ram Nagar, New Delhi, India

Course Title: Value Added Course II Digital Empowerment through Artificial Intelligence, Multimedia and Cyber Security	Course Type: Theory
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Total Hours: 30 Hours/Week: 2 Credit: 1	Course Code: 23SE21
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Pass-Out Policy: Minimum Contact Hours: 18 Total Score %:100 Internal: 40 External: 60 Minimum Pass %: 40[No Minimum for Internal]
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Course Creator	Expert 1	Expert II
Dr. B. Shamina Ross	Mrs. P. Ezhil Roja	Dr. C. Thinkal Dayana
Associate Professor	Assistant Professor	Assistant Professor
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shaminas@hotmail.com	roja_z@yahoo.com	thinkaldayana@gmail.com

CLO- No.	Course Learning Outcomes <i>Upon completion of this course, students will be able to:</i>	% of PLO Mapping with CLO	CLO & PLO Mapped with GA#	Cognitive Level (CL)	Knowledge Category (KC)
CLO-1	understand the evolution of computers, computing concepts and the various applications of computers	1(10), 6(10)	1, 8, 5	R, U	F, C
CLO-2	understand Internet Application, World Wide Web, Web Browsers and e-mail service	5(6), 6(7), 8(7)	1, 5, 6, 7	U	F, C, M
CLO-3	analyze features and types of E-commerce model and applications and Multimedia Technology concepts	6(7), 9(6), 10(7)	1, 5, 7	An	F, C
CLO-4	evaluate the basics of AI, Robotics and Computer Vision	7(7), 9(7), 10(6)	5, 8, 10	E	F, C, M
CLO-5	understand the basic concepts of Cyber Security, types of	6(17), 10(9)	1, 5	U	F, C, M

	security threats and safety measures				
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Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
	Evolution of Digital System					
1.1	Introduction and Evolution of Computers	2	1[33]	Lec	CA	1
1.2	Generations of Computers	1	1[17]	FC	HrA	1
1.3	Computing Concepts, The Computer System	2	1[33]	OO	OT	1
1.4	Applications of Computers	1	1[17]	RF	SA	1
	Communication and Collaboration in Digital World					
2.1	Introduction, Applications of Internet	2	2[33]	Lec	HoA	1
2.2	Understanding the World Wide Web	1	2[17]	Sem	ST	1
2.3	Web Browsers	2	2[33]	SI	CA	1
2.4	E-mail Service	1	2[17]	GT	OT	1
	E-Commerce and Multimedia					
3.1	E-Commerce: Introduction, Features of E-Commerce	1	3[17]	Lec	ST	2
3.2	Types of E-commerce Model, Business Application of E-commerce	1	3[17]	Sem	CT	2
3.3	Uses of E-commerce, Traditional Commerce Vs E-Commerce, Advantages of E-Commerce, Disadvantages of E-Commerce	2	3[33]	GT	CA	2
3.4	Multimedia: Introduction, Elements of Multimedia, Applications of Multimedia, Advantages of Multimedia and Disadvantages of Multimedia.	2	3[33]	SI	HoA	3
	Artificial Intelligence					
4.1	Introduction, Goals of AI, History of AI, Applications of AI, Intelligence	2	4[33]	GT	CT	4
4.2	Robotics: Robot Locomotion, Application of Robotics.	2	4[33]	Sem	HrA	4
4.3	Computer Vision: Task of computer Vision	1	4[17]	BS	CA	4
4.4	Application Domains of Computer Vision	1	4[17]	SI	Qui	4
	Cyber Security					
5.1	Introduction, Types of Cyber Security	2	5[33]	Lec	SA	5
5.2	Importance of Cyber Security	1	5[17]	GD	HrA	5

5.3	Types of Cyber Security Threats	1	5[17]	FC	MCQ	5
5.4	Benefits of Cyber Security, Cyber Security Measures	2	5[33]	GT	CT	5

BOOKS FOR REFERENCE:

1. E. Balagurusamy, "Fundamentals of Computers", Tata McGraw Hill Education, Private Limited, 2009. New Delhi.
2. David Whiteley, "e-commerce-Strategy, Technology and Applications", Tata McGraw-Hill Publishing Company Limited, First Edition, Reprint 2007
3. Ralf Steinmetz, Klara Nahrstedt, "Multimedia: Computing Communications & Applications" Pearson Education, January, 2002
4. Eugene Charniak, Drew McDermott, "Introduction to Artificial Intelligence", Pearson Education, January, 2002.
5. Anad Shinde, "Introduction to Cyber Security", Guide to the World of Cyber Security Paperback-5, February 2021.

Course Title:	PHYSICS FOR EVERYDAY LIFE	Course Type: Theory
Course Code: 23GPNI		
Total Hours: 30	Hours/Week: 2	Credits: 2
Pass-Out Policy :		
Minimum Contact Hours: 18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. S. Sharmila Juliet	Dr. D.J. Jeejamol
Asso. Prof., Faculty Head	Assi. Prof. of Physics	Assi. Prof. of Physics
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achroy66@gmail.com	sharmilabennet@gmail.co	lomajeej@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	To know where all physics principles have been put to use in daily life and appreciate the concepts with a better	9[20]	4,9	U, Ap	F, C
CLO-2	To know the principles have been used in optical instruments and laser devices.	9[20]	4,9	U,An	P
CLO-3	To know the working principles and the components of electrical home appliances that has been used in everyday life.	9[20]	4,9	U, Ap	F, M
CLO-4	To understand the Solar energy and its applications used in different appliances like solar water heater, photovoltaic cell, etc.	9[20]	4,9	E	C, P

CLO-5	To know about Indian scientists who have made significant contributions to Physics.	9[20]	4,9	R, U	P, M
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Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	MECHANICAL OBJECTS:					
1.1	Spring scales	1	1[10]	Lec	Pro	1
1.2	Bouncing balls	1	1[20]	Lec	SA	1
1.3	Roller coasters	1	1[20]	Lec	Ess	1
1.4	Bicycles	1	1[20]	GD	SA	1
1.5	Rockets	1	1[20]	CL	Sem	1
1.6	Space travel.	1	1[10]	CS	SA	1
II	OPTICAL INSTRUMENTS AND LASER:					
2.1	Vision Corrective Lenses	1	2[10]	Lec	Ess	1
2.2	Polaroid Glasses	1	2[10]	Lec	SA	1
2.3	UV Protective Glass	1	2[20]	Lec	SA	1
2.4	Polaroid Camera	1	2[20]	Lec	Ess	1
2.5	Colour Photography	1	2[20]	GT	SA	1
2.6	Holography and Laser	1	2[20]	TPS	SA	1
III	PHYSICS OF HOME APPLIANCES:					
3.1	Bulb – Fan	1	3[10]	Lec	SA	1
3.2	Hair drier	1	3[10]	GD	Ess	1
3.3	Television	1	3[20]	Lec	SA	1
3.4	Air conditioners	1	3[20]	EL	SA	1
3.5	Microwave Ovens	1	3[20]	Lec	Ess	1
3.6	Vacuum Cleaners	1	3[20]	GT	Ess	1
IV	SOLAR ENERGY:					
4.1	Solar Constant	1	4[20]	Lec	Pro	1
4.2	General Applications of Solar Energy	1	4[20]	TPS	Ess	1
4.3	Solar Water Heaters	1	4[20]	Lec	Ess	1
4.4	Solar Photo Voltaic Cells	2	4[20]	Lec	Ess	1
4.5	General Applications of Solar Cells	1	4[20]	GD	SA	1
V	INDIAN PHYSICIST AND THEIR CONTRIBUTIONS:					
5.1	C.V. Raman,	1	5[20]	GD	Ess	2
5.2	Homi Jehangir Bhabha,	1	5[15]	Lec	SA	2
5.3	Vikram Sarabhai	1	5[15]	GD	SA	2
5.4	Subrahmanyam Chandrasekhar	1	5[15]	Lec	SA	2
5.5	Venkatraman Ramakrishnan	1	5[15]	Lec	SA	2

5.6	Dr. APJ. Abdul Kalam	1	5[20]	GD	Ess	2
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BOOKS FOR REFERENCE:

1. The Physics in our Daily Lives, Umme Ammara, Gugucol Publishing, Hyderabad, 2019.
2. For the love of physics, Walter Lawin, Free Press, New York, 2011.

SEMESTER – V

Course Title:	BASIC ELECTRONICS	Course Type: Theory
Course Code: 23GP51		
Total Hours: 90	Hours/Week: 6	Credits: 5
Pass-Out Policy : Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy	Dr. B.S. Benila	Dr. D.J. Jeejamol
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Assi. Prof. of Physics
+919944261881	+919843626563	+917598629087
achroy66@gmail.com	benjane.benila@gmail.com	lomajeej@gmail.com

CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Explain basic circuit concepts and responses	2[10] 7[10]	1,2,5, 7	R, U	C,F
CLO-2	List the various types of semiconductors and this applications	2[10] 7[10]	1,2,5, 7	U	F,P
CLO-3	Explain the various types of oscillators and design simple oscillator circuits	2[10] 7[10]	1,2,5, 7	Ap, An	P
CLO-4	Classify transistor amplifier circuits and analyze the frequency response	2[10] 7[10]	1,2,5, 7	An, E	M

CLO-5	Understand the need for biasing a transistor and Explain and construct the common operational amplifiers	2[10] 7[10]	1,2,5, 7	U, Ap	F, M
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Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	NETWORK THEOREMS & SEMICONDUCTOR DIODES					
1.1	Superposition theorem	1	1[5]	Lec	Qui	1
1.2	Thevenin's theorem	1	1[10]	GD	Ass	1
1.3	Norton's theorem	1	1[5]	Lec	MCQ	1
1.4	Conductors, insulators, semiconductors	1	1[5]	Lec	Qui	1
1.5	Types of semiconductors – intrinsic semiconductor – extrinsic semiconductor – n-type, p-type semiconductors	2	1[15]	Lec	Ass	1
1.6	P-N junction diode – forward and reverse	1	1[10]	Lec	SA	1
1.7	Application of semiconductor diodes	1	1[5]	Lec	SA	1
1.8	Diode ratings	1	1[10]	Lec	Ess	1
1.9	Bridge rectifier	1	1[10]	EL	Ess	1
1.10	The ideal diode – the real diode	1	1[5]	EL	Ess	1
1.11	Clippers and clampers	1	1[5]	Lec	MCQ	1
1.12	Zener diode – characteristics – Zener breakdown – avalanche breakdown	1	1[5]	GD	SA	1
1.13	Voltage regulation	1	1[5]	EL	SA	1
1.14	Problems	1	1[5]	EL	Ess	1
II	BIPOLAR TRANSISTOR					
2.1	Bipolar junction transistor	1	2[5]	Lec	MCQ	1
2.2	Transistor biasing	1	2[5]	EL	Qui	1
2.3	Common base and common emitter static characteristics	2	2[10]	Lec	SA	1
2.4	Relation between α and β	2	2[15]	EL	Ess	1
2.5	DC load line	1	2[10]	Lec	Ass	1
2.6	Q-point and maximum undistorted output	1	2[10]	GD	Ass	1

2.7	Need for biasing a transistor - β sensitivity	1	2[10]	EL	Ess	1
2.8	Different methods of transistor biasing – base bias with fixed current bias – voltage divider bias.	2	2[10]	Lec	Ess	1
2.9	AC load line	2	2[10]	EL	Ass	1
2.10	H parameters	1	2[10]	EL	Ess	1
2.11	Hybrid CE circuit	1	2[5]	EL	Ess	1
III	TRANSISTOR AMPLIFIERS					
3.1	Single stage CE amplifier	1	3[10]	Lec	Qui	1
3.2	Classification of amplifiers based on biasing	1	3[10]	Lec	Ess	1
3.3	Transformer coupled class A amplifier – expression for maximum efficiency	2	3[10]	GD	Ass	1
3.4	Class B push pull amplifier	2	3[10]	Lec	Ess	1
3.5	RC coupled two stage amplifier – voltage gain	2	3[5]	GD	SA	1
3.6	Frequency response	1	3[10]	Lec	MCQ	1
3.7	Feedback amplifiers	1	3[10]	Lec	Qui	1
3.8	Principle of feedback amplifiers – negative feedback – positive feedback.	2	3[10]	Lec	Ess	1
3.9	Advantages of negative feedback	1	3[5]	GD	SA	1
3.10	Forms of negative feedback	2	3[5]	EL	MCQ	1
IV	SINUSOIDAL AND NON-SINUSOIDAL OSCILLATORS					
4.1	Classification of oscillators	1	4[5]	Lec	Ass	1
4.2	The oscillatory circuit	2	4[10]	Lec	Ess	1
4.3	Frequency stability of an oscillator	2	4[10]	GD	Ess	1
4.4	Lissajous's figures,	1	4[5]	Lec	SA	1
4.5	Essentials of a feedback ALC oscillator	1	4[10]	Lec	Ess	1
4.6	Tuned collector oscillator	2	4[10]	Lec	Ess	1
4.7	Hartley oscillator	2	4[10]	Lec	Ess	1
4.8	Colpitt's oscillator	1	4[5]	GD	MCQ	1
4.9	Phase Shift oscillator	1	4[15]	GD	SA	1
4.10	Multivibrators: – Astable multivibrator	1	4[10]	EL	Ess	1
4.11	Monostable multivibrator	1	4[10]	EL	Ess	1

V	OPERATIONAL AMPLIFIER					
5.1	Integrated circuits	1	5[5]	Lec	SA	1
5.2	Advantages of ICs	1	5[5]	Lec	Ass	1
5.3	Fabrication of IC components	1	5[5]	Lec	Ass	1
5.4	OP-amp-ideal operation amplifier – virtual ground and summing point	1	5[5]	Lec	Qui	1
5.5	Applications of Op-amp – inverting and non-inverting amplifiers	3	5[20]	Lec	Ess	1
5.6	Unity follower – adder	1	5[5]	GD	MCQ	1
5.7	Subtractor – integrator	2	5[10]	GD	Ess	1
5.8	Differentiator – comparator	2	5[20]	Lec	Ess	1
5.9	Drawbacks of ICs	2	5[15]	Lec	Ess	1
5.10	Monolithic ICs	1	5[10]	GD	Qui	1

BOOKS FOR REFERENCE:

1. B.L. Thereja, Basic Electronics (Solid State), S. Chand & Co. Ltd., New Delhi, 2004.
2. D. Roy Chaudry, Shail jain, Linear Integrated Citrcuits, New Age International (O) Ltd., New Delhi, 2002.
3. Albert Paul Malvino, Electronic Principles, III Edition, Tata MaGraw, New Delhi, 1986.
4. G.J. Deboo & C.N. Burrows, Integrated Circuits and Semiconductor Devices, Tata McGraw Hill, Kogakusha Ltd., 1977.

Course Title:	NONELECTRONICS I	Course Type: Practical V
Course Code: 23GPP5		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. C. Besky Job	Dr. S. Sharmila Juliet
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CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Catogory KC
CLO-1	Study the elastic behaviour of materials	2[10] 6[10]	1,2,3	R, U	C
CLO-2	Analyse the relationship between various types of experiments	2[10] 6[10]	1,2,3	U	F

CLO-3	Perform the procedure as per standard values and understand the applications	2[10] 6[10]	1,2,3	Ap, An	F, P
CLO-4	Study the emf, resistance, behaviour of the materials and analyse the relationship between $\tan \alpha$ and $\tan \beta$	2[10] 6[10]	1,2,3	An, E	P
CLO-5	Analyse the specific heat capacity, refractive index, as per the standard procedure and understand the standard values of the results	2[10] 6[10]	1,2,3	U, Ap	P, M

No.	Description
1	To find the wavelength of different spectral lines using Hartmann's Interpolation formula
2	To form elliptical fringes and to find out the Young's modulus of the given glass plate
3	To find the unknown resistance of the given coil and temperature coefficient of the same coil using potentiometer
4	To find the self-inductance of the given coil using Anderson's bridge method
5	To determine mutual inductance between two coils used in the circuit using B.G
6	Compare the mutual inductance of two coils used in the circuit using B.G
7	To find the wavelength of spectral lines with different angle of oblique incidence
8	To draw B-H curve to verify the hysteresis and to measure coercivity and retentivity using Anchor ring
9	To measure the output voltage, resistance of the given circuit and its equivalent circuit on the basis of Thevenin's and Norton's and to verify that both are equal.
10	To convert galvanometer into voltmeter of different ranges to measure the potential differences in electrical circuits

Course Title:	ELECTRONICS I	Course Type: Practical VI
Course Code: 23GPP6		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy :		
Minimum Contact Hours: 18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. B.S. Benila	Dr. C. Besky Job

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CLO-No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	To give knowledge of some basic electronic components and circuits.	2[10] 6[10]	1,2,3	R, U	C
CLO-2	Understand the purpose of various components like diode, transistor and IC with their functions.	2[10] 6[10]	1,2,3	U	F
CLO-3	To understand how to construct circuits in a simple way, by knowing the biasing rules of the devices.	2[10] 6[10]	1,2,3	Ap, An	F, P
CLO-4	To understand circuit performance and trouble shooting and to verify the experimental results with theoretical values.	2[10] 6[10]	1,2,3	An, E	P
CLO-5	To expose the students to working of some power electronic devices, transducers and application of transducers.	2[10] 6[10]	1,2,3	U, Ap	P, M

No.	Description
1	To find the frequency of oscillation of a square wave generator using IC-741.
2	To verify Demorgan's laws using logic gates.
3	To construct inverting and non-inverting amplifier using op-amp and to verify the results with theoretical values.
4	To draw the forward and reverse characteristics of zener diode and hence to find the static resistance, dynamic resistance and breakdown voltage.
5	To construct basic logic gates using discrete components and to verify the truth table.
6	To construct colpitt's oscillator and to measure the frequency of oscillation.
7	To construct adder and subtractor using op-amp and to verify the results with theoretical values.
8	To Construct Hartley oscillator and to measure the frequency of oscillation.

Note : Use of digital balance and calculators are permitted.

Course Title:	COMPUTER PROGRAMMING IN C++	Course Type: Theory
Course Code: 23GPEA		
Total Hours: 90	Hours/Week: 6	Credits: 5
Pass-Out Policy : Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. S. Sharmila Juliet	Dr. B.S. Benila
Asso. Prof., Faculty Head	Assi. Prof. of Physics	Asso. Prof. of Physics
+919944261881	+919487094860	+919843626563
achroy66@gmail.com	sharmilabennet@gmail.com	benjane.benila@gmail.com

CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Outline the basic concepts of Object Oriented Programming Languages and list out the tokens used in C++ with other programming fundamentals including statements.	4[20]	1,2,7, 10	R, U	C
CLO-2	Develop skill to make use of basic data structures using Arrays, Pointers and Functions.	4[20]	1,2,7, 10	U	F
CLO-3	Design data structures by creating Class, Objects and Constructors. Differentiate the types of constructors used in C++ programs.	4[20]	1,2,7, 10	Ap, An	F, P
CLO-4	Apply the concepts of inheritance and make use of different types of inheritance through C++ programs for solving Physics problems.	4[20]	1,2,7, 10	An, E	P
CLO-5	Make use of File concept to store, edit and print data through C++ programs.	4[20]	1,2,7, 10	U, Ap	P, M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I BASIC CONCEPTS OF OOPS, TOKENS & STATEMENTS						
1.1	Introduction to Objects-Object Oriented	1	1[5]	Lec	SA,	1,2

	Programming Language				Ess	
1.2	Basic Concepts of OOPs: Objects, Classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding & Message Passing	1.5	1[10]	Lec	SA, Ess	1,2
1.3	Tokens: Identifiers, Keywords, Constants, String and Operators	1	1[10]	BS	MCQ SA	1
1.4	Constant: String Constant, Numeric Constant, Character Constant	1	1[5]	GD	Qui, MCQ	1,2
1.5	Declaration and Dynamic Initialization of Variables.	1	1[5]	Lec	SA	1,2
1.6	Operators : Arithmetic Operator, Assignment Operator,	1	1[10]	Lec	SA, Ess	1
1.7	Program: Simple Arithmetic Operator using cin and cout	0.5	1[5]	SI	Pro	
1.8	Comparison and Logical Operators	1	1[5]	BS	SA, MCQ	1,2
1.9	Special Operators, Scope Resolution Operator and Type Conversion	1	1[5]	Lec	SA, Ess	1,2
1.10	Predefined Manipulators & Non graphic characters	1	1[5]	Lec	SA, MCQ	2
1.11	Statement: Expression, Compound, Control Statement	1	1[10]	Lec	SA, Ess	2
1.12	Conditional Expressions : if, if-else, switch case Statement, Program: Roots Using Quadratic Equation	1	1[10]	SI	SA, Pro	2
1.13	Loop Statements : for, while, do-while Loop, Program: Convert temperature from Centigrade to Fahrenheit using Loops	1	1[5]	BS, SI	SA, Pro	2
1.14	Breaking Control Statements:-break, continue, goto	1	1[5]	Lec	SA, MCQ	2
1.15	Program: Tension in the string of Atwood's machine using if-else statement	1	1[5]	SI	Pro	
ARRAYS, POINTERS AND FUNCTIONS						
2.1	Arrays-Array Notation-Declaration	1	2[10]	Lec	SA	2
2.2	Initialization Processing with Array	1	2[10]	Lec	SA	2
2.3	Multidimensional , Character Array	1	2[10]	BS	SA	2
2.4	Program: Matrix Transpose, Addition and Multiplication	1	2[5]	SI	Pro	2
2.5	Pointer Declaration-Pointer Operator-Address Operator	1	2[10]	GD	SA, MCQ	2
2.6	Pointers - Call By Value - Call By Reference	1	2[5]	Lec	SA	2
2.7	Program: Read String and Display Using Pointer Technique	1	2[5]	SI	Pro	
2.8	The Main Function: Return type, Non	2	2[5]	Lec	SA,	1,2

	Return Type				Ess	
2.9	Function: with return statement, without return statement	1	2[5]	Lec	SA, Ess	1
2.10	Program: Young's Modulus of the Given Material Using Function with return statement	1	2[5]	SI	Pro	
2.11	Inline Function	1	2[5]	Lec	SA	1,2
2.12	Default & Constant Arguments	1	2[5]	BS	SA	1
2.13	Function Overloading	1	2[5]	Lec	SA	1
2.14	Program: Volume of Cube, Cylinder and Rectangular Box by Function Overloading.	0.5	2[5]	SI	Pro	
2.15	Program: The maximum height, time of flight & range of a projectile using Function without return statement	0.5	2[5]	SI	Pro	
CLASS AND CONSTRUCTOR						
3.1	Classes: Definition and Declaration	1	3[10]	Lec	SA	1,2
3.2	Member Function	1	3[5]	Lec	SA	1,2
3.3	Objects	1	3[10]	Lec	SA	1,2
3.4	Accessing Member of a Class	1	3[5]	BS	SA	1,2
3.5	Types of Classes, Nested Class	1	3[5]	BS	SA	1,2
3.6	Constructors	1	3[10]	Lec	SA	1,2
3.7	Copy Constructor, Default Constructor	1	3[10]	Lec	SA	1,2
3.8	Multiple Constructor	1	3[10]	BS	SA	1,2
3.9	Destructors with Default Arguments	1	3[10]	GD	SA	1,2
3.10	Inline Member Function	1	3[5]	BS	SA, Qui	1,2
3.11	Friend Function	1	3[5]	Lec	SA	1,2
3.12	Programs :Period of Oscillation of simple Pendulum Using Class	1	3[5]	SI	Pro	
3.13	Program: Fibonacci Series Using Constructor	1	3[5]	SI	Pro	2
3.14	Program: Simple Banking System - Using Constructor and Destructor	1	3[5]	SI	Pro	2
INHERITANCE AND OPERATOR OVERLOADING						
4.1	Direct and Indirect Base Class	1	4[5]	Lec	SA	2
4.2	Inheritance - Single Inheritance	1	4[5]	Lec	SA	1,2
4.3	Multilevel Inheritance	1	4[10]	BS	SA	1,2
4.4	Multiple Inheritance	0.5	4[10]	BS	SA	1
4.5	Hierarchical Inheritance	0.5	4[10]	GD	SA	1
4.6	Hybrid Inheritance	0.5	4[10]	GD	Ass	1
4.7	Virtual Base Classes	0.5	4[10]	Lec	SA	1
4.8	Member Classes	1	4[5]	LEc	SA	1
4.9	Operator Overloading,	1	4[5]	Lec	SA	1,2
4.10	Binary Operator Overloading - Unary Operator Overloading	2	4[10]	BS	Ess, Pro	1,2
4.11	Program: To add two complex numbers	0.5	4[5]	SI	Pro	2
4.12	Program: Students Information Using	0.5	4[5]	SI	Pro,	2

	Inheritance				MPr	
4.13	Program: Total Mark of Student Using Multilevel Inheritance	1	4[5]	SI	Pro, MPr	2
4.14	Program: Speed of a particle having energy as twice of its rest mass energy using class	1	4[5]	SI	Pro	2
DATA FILE OPERATIONS						
5.1	Files – Classes for File Stream Classes	2	5[10]	Lec	Ess	1
5.2	Opening and Closing of Files	1	5[10]	Lec	Ess	1
5.3	Detecting end- of- file	1	5[10]	BS	SA	1
5.4	File Pointers and their Manipulators	1	5[10]	GD	SA	1
5.5	Sequential input & output operations: put(), get(), write(), read()	2	5[10]	BS	SA, Ess	1
5.6	Reading Characters from a File	1	5[10]	TPS	SA	1
5.7	Writing Characters in a File	1	5[10]	TPS	SA	1
5.8	Reading and writing a class object	1	5[10]	GD	SA	1
5.9	Program: To store data in Tabular form using Files	1	5[10]	SI	Pro	1
5.10	Program: Reading/Writing class object from File	1	5[5]	SI	Pro	1
5.11	Program: Surface tension of different liquids in a capillary tube of given radius and storing the results in a file	2	5[5]	CS	Pro, MPr	

BOOKS FOR REFERENCE:

1. E. Balagurusamy, Object Oriented Programming with C++ 2/e, Tata McGraw-Hill Publishing (P) Ltd., New Delhi, 2005.
2. D. Ravi Chandran, Programming with C++, Tata McGraw – Hill Publishing Co. Ltd., New Delhi, 1996.
3. Robert Lafore, Object Oriented Programming in C++ 4/e, Pearson Education in South Asia Publication, New Delhi, 2009.
4. R. Rajaram, Object Oriented Programming in C++ 2/e, New Age International Publishers, New Delhi, 2007.
5. Bjarne Stroustrup, The C++ Programming Language 4/e, Addison-Wesley Publication, New York, 2000.

Course Title:	COMPUTER PROGRAMMING IN C++	Course Type: Practical VII
Course Code: 23GPP7		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy :		
Minimum Contact Hours:18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles ozy Roy	Dr. S. Sharmila Juliet	Dr. B.S. Benila

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CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Apply control flow structures, including loops and conditional statements, to solve problems.	4[20]	1,2,7,10	R, U	P
CLO-2	Implement Object-Oriented Programming concepts Classes and objects, Inheritance, polymorphism, encapsulation, and abstraction.	4[20]	1,2,7,10	U	P
CLO-3	Develop programs using Constructors and Destructors, Understand Operator overloading and Type conversion.	4[20]	1,2,7,10	Ap, An	F, P
CLO-4	Implement inheritance, polymorphism, encapsulation, and abstraction in practical programming scenarios.	4[20]	1,2,7,10	An, E	P
CLO-5	Develop programs that read from and write to files for data storage and retrieval and Utilize file streams and handle file I/O operations in practical situations.	4[20]	1,2,7,10	U, Ap	P, M

No.	Description
1	Write a program to convert given temperature in Centigrade unit to Fahrenheit unit using do- while loop concept.
2	Write two separate programs to find the sum of the given series: i. $S = 1 + 2^2 + 4^2 + \dots n$ ii. $S = x - x^3/3! + x^5/5! - \dots x^n/n!$
3	Write a program to solve the following quadratic equations and find the roots using if-else statement: $x^2+4x+4=0$; $x^2+x-6=0$; $2x^2+3x-5=0$
4	Write a program to multiply two matrices of different orders 2 x 3 and 3x2.
5	Create a program to print the Fibonacci series of order 10 using constructor.
6	Write a program to find the Young's Modulus of the bar of thickness 5.1 mm, breadth 2.7 cm, using the uniform bending method with average elevation $y = 0.001$ for the average mass variation of 50 gm kept at a = 10 cm, $l = 60$ cm and $g = 9.8$ m/s ² .
7	Write a program to calculate the Speed of a particle having energy as twice of its rest mass energy using class concept
8	Write a program to find the Tension in the string of Atwood's machine using if-else statement.
9	Write a single program to sort given 10 numbers in ascending and descending order and find the biggest & smallest among them.
10	Write a program to evaluate Surface tension of different liquids in a capillary tube of given radius and storing the results in a file.

Course Title:	FUNDAMENTALS OF IOT		Course Type: Theory
Course Code: 23PSP3			
Total Hours: 30	Hours/Week: 2	Credits: 1	
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Ajay Roy	Dr. S. Sharmila Juliet	Dr. B.S. Benila	
Asso. Prof., Faculty Head	Assi. Prof. of Physics	Asso. Prof. of Physics	
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achroy66@gmail.com	sharmilabennet@gmail.com	benjane.benila@gmail.com	

CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand the various concepts, terminologies and architecture of IoT systems.	4[20]	1,2,7,10	R, U	P
CLO-2	Use sensors and actuators for design of IoT. Understand and apply various protocols for design of IoT systems	4[20]	1,2,7,10	U	P
CLO-3	Use various techniques of data storage and analytics in IoT	4[20]	1,2,7,10	Ap, An	P
CLO-4	Understand APIs to connect IoT related technologies.	4[20]	1,2,7,10	An, E	P
CLO-5	Understand the role of IoT in various domains of Industry.	4[20]	1,2,7,10	U, Ap	P, M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I FUNDAMENTALS OF IOT						
1.1	Introduction	1	1[5]	Lec	SA, Ess	1,2
1.2	Definitions & Characteristics of IoT	1.5	1[10]	Lec	SA, Ess	1,2
1.3	IoT Architecture	1	1[10]	BS	MCQSA	1

1.4	Physical & Logical Design of IoT	1	1[5]	GD	Qui, MCQ	1,2
1.5	Enabling Technologies in IoT	1	1[5]	Lec	SA	1,2
1.6	History of IoT	1	1[10]	Lec	SA, Ess	1
1.7	About Things in IoT	0.5	1[5]	SI	Pro	
1.8	The Identifiers in IoT	1	1[5]	BS	SA, MCQ	1,2
1.9	About the Internet in IoT	1	1[5]	Lec	SA, Ess	1,2
1.10	IoT frameworks	1	1[5]	Lec	SA, MCQ	2
1.11	IoT and M2M	1	1[10]	Lec	SA, Ess	2
II SENSORS NETWORKS						
2.1	Definition	1	2[10]	Lec	SA	2
2.2	Types of Sensors	1	2[10]	Lec	SA	2
2.3	Types of Actuators	1	2[10]	BS	SA	2
2.4	Examples and Working	1	2[5]	SI	Pro	2
2.5	IoT Development Boards	1	2[10]	GD	SA, MCQ	2
2.6	Arduino IDE and Board Types	1	2[5]	Lec	SA	2
2.7	RaspberriPi Development Kit	1	2[5]	SI	Pro	
2.8	RFID Principles and components	2	2[5]	Lec	SA,	1,2
2.9	Wireless Sensor Networks	1	2[5]	Lec	Ess	1
2.10	History and Context	1	2[5]	SI	Pro	
2.11	The node	1	2[5]	Lec	SA	1,2
2.12	Connecting nodes	1	2[5]	BS	SA	1
2.13	Networking Nodes	1	2[5]	Lec	SA	1
2.14	WSN and IoT	0.5	2[5]	SI	Pro	
III WIRELESS TECHNOLOGIES FOR IOT						
3.1	WPAN Technologies for IoT	1	3[10]	Lec	SA	1,2
3.2	IEEE 802.15.4	1	3[5]	Lec	SA	1,2
3.3	Zigbee	1	3[10]	Lec	SA	1,2
3.4	HART	1	3[5]	BS	SA	1,2
3.5	NFC - Z-Wave	1	3[5]	BS	SA	1,2
3.6	BLE – Bacnet – Modbus	1	3[10]	Lec	SA	1,2
3.7	IP Based Protocols for IoT IPv6	1	3[10]	Lec	SA	1,2
3.8	6LowPAN – RPL – REST - AMPQ, CoAP – MQTT	1	3[10]	BS	SA	1,2
3.9	Edge connectivity and protocols	1	3[10]	GD	SA	1,2
IV DATA HANDLING & ANALYTICS						
4.1	Introduction	1	4[5]	Lec	SA	2
4.2	Bigdata - Types of data,	1	4[5]	Lec	SA	1,2
4.3	Characteristics of Big data	1	4[10]	BS	SA	1,2
4.4	Data handling Technologies	0.5	4[10]	BS	SA	1
4.5	Flow of data	0.5	4[10]	GD	SA	1
4.6	Data acquisition	0.5	4[10]	GD	Ass	1
4.7	Data Storage	0.5	4[10]	Lec	SA	1
4.8	Introduction to Hadoop	1	4[5]	LEc	SA	1
4.9	Introduction to data Analytics	1	4[5]	Lec	SA	1,2
4.10	Types of Data analytics	2	4[10]	BS	Ess,	1,2
4.11	Local Analytics, Cloud analytics and applications	0.5	4[5]	SI	Pro	2

V APPLICATIONS OF IOT						
5.1	Home Automation	2	5[10]	Lec	Ess	1
5.2	Smart Cities	1	5[10]	Lec	Ess	1
5.3	Energy Protection.	1	5[10]	BS	SA	1
5.4	Retail Management	1	5[10]	GD	SA	1
5.5	Logistics	2	5[10]	BS	Ess	1
5.6	Agriculture	1	5[10]	TPS	SA	1
5.7	Health and Lifestyle	1	5[10]	TPS	SA	1
5.8	Industrial IoT	1	5[10]	GD	SA	1
5.9	Legal challenges	1	5[10]	SI	Pro	1
5.10	IoT design Ethics	1	5[5]	SI	Pro	1
5.11	IoT in Environmental Monitoring	2	5[5]	CS	Pro	1

BOOKS FOR REFERENCE:

1. Hakima Chaouchi, – “The Internet of Things Connecting Objects to the Web” ISBN :978-1- 84821-140-7, Wiley Publications
2. Olivier Hersent, David Boswarthick, and Omar Elloumi, – “The Internet of Things: Key Applications and Protocols”, Wiley Publications
3. Vijay Madiseti and Arshdeep Bahga, – “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
4. J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 2016.
5. Daniel Minoli, – “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Wiley Publications.
6. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press.
7. Keysight Technologies, “The Internet of Things: Enabling Technologies and Solutions for Design and Test”, Application Note, 2016.

Course Title: Value Added Course III
Indian Knowledge System and Human Rights

Course Type: **Theory**

Total Hours: 30 Hours/Week: 2 Credit: 1

Course Code: **23SE31**

Pass-Out Policy: Minimum Contact Hours: 18
 Total Score %:100 Internal: 40 External: 60
 Minimum Pass %: 40[No Minimum for Internal]

Course Creator

Expert 1

Expert II

Dr. G. Anish S. Georshia
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CLO- No.	Course Learning Outcomes <i>Upon completion of this course, students will be able to:</i>	% of PLO Mapping with CLO	CLO & PLO Mapped with GA#	Cognitive Level (CL)	Knowledge Category (KC)
CLO-1	understand the diverse cultural heritage of India.	3(10), 8(10)	1, 5, 8, 9	U	F
CLO-2	analyze the historical evolution of Indian society and the conservation of traditional knowledge in modern India.	6(8), 8(12)	2, 5, 9	An	P
CLO-3	understand basic concepts and principles in Indian astrology and astronomy.	3(13), 8(7)	1, 5, 8, 9	C	C
CLO-4	apply principles of Ayurveda, Siddha and Unani to achieve a balanced lifestyle.	3(5), 7(4), 8(4), 9(7)	1, 2, 4, 5, 8, 9	Ap	P
CLO-5	analyze the duties and constitutional responsibilities of Indian citizens and human rights in India	3(5), 8(5), 10(10)	1, 2, 5, 9, 10	E	M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	Introduction					
1.1	Overview of India's diversity, languages, religions, and regional variations	2	1[33]	AW	CA	2
1.2	Historical background and evolution of Indian society	2	1[33]	Ess	ST	2
1.3	Conservation and Revival of Traditional Knowledge in Modern India	2	1[34]	Rev	OT	2
II	Indian Culture					
2.1	Traditional Arts and Crafts of India	2	2[33]	TPS	OBT	2

2.2	Festivals and Celebrations in Indian Culture	1	2[17]	PT	HoA	2
2.3	Classical Dance and Music Forms of India	1	2[17]	GT	OBT	1
2.4	Culinary Traditions and Indian fashion	2	2[33]	CW	HoA	1
III	Indian Astrology and Astronomy					
3.1	Basic Concepts and Principles in Indian Astrology	2	3[33]	GD	SA	1
3.2	Zodiac Signs, Influence of Planetary Positions, Birth Charts and Horoscopes	1	3[17]	KWL	Qui	1
3.3	Applications and Relevance of Indian Astronomy	1	3[17]	Soc	ST	2
3.4	Ancient Indian Mathematics and Development of number systems	2	3[33]	BS	CT	2
IV	Indian Ayurveda, Siddha and Unani					
4.1	Introduction to Ayurveda: Principles and Doshas	2	4[33]	Rev	OBT	2
4.2	Key Concepts of Ayurvedic Medicine	2	4[33]	CW	MCQ	2
4.3	Importance of Siddha and Unani	2	4[34]	Rep	Qui	2
V	Human Rights in India					
5.1	Human Rights: Definition and Evolution	1	5[17]	Lec	Ess	2
5.2	Fundamental Human Rights and Constitutional Values in the Indian Constitution	1	5[17]	KWL	HoA	2
5.3	Protection of p and Freedoms – Safeguarding Social and Economic Rights	2	5[33]	Sem	OT	2
5.4	Women’s and Children’s Rights and Rights of Minorities	2	5[33]	GT	HrA	2

Reference Books:

1. Bhatia, Tej K. *Indian Culture and Heritage*. New Delhi, Prabhat Prakashan, 2018.
2. Thapar, Romila. *The Penguin History of Early India: From the Origins to AD 1300*. Penguin Books, 2003.
3. Choudhry, G.K. *How to Judge a Horoscope: Volume II*. New Delhi, Sagar Publications, 2002.
4. Sarma, P.S. *Astronomy in India: A Historical Perspective*. Springer, 2014.
5. Pingree, David. *Jyotihśāstra: Astral and Mathematical Literature*. Otto Harrassowitz Verlag, 1981.

6. Frawley, David, and Vasant Lad. *The Yoga of Herbs: An Ayurvedic Guide to Herbal Medicine*. Lotus Press, 2001.
7. Gupta, L. C. *Fundamentals of Ayurvedic Medicine*. Chaukhamba Sanskrit Pratishtan, 2002.
8. Sahni, Julie. *Classic Indian Cooking*. William Morrow Cookbooks, 1980.
9. Harle, J.C. *The Art and Architecture of the Indian Subcontinent*. Yale University Press, 1994.
10. Craven, Roy C. *Indian Art: A Concise History*. Thames & Hudson, 2010.
11. Anand, Meenakshi, and A. G. Noorani. *Human Rights in India: Historical, Social, and Political Perspectives*. Oxford University Press, 2017.
12. Kapur, Ratna. *Gender, Alterity and Human Rights: Freedom in a Fishbowl*. Routledge, 2017.

Course Title:	RENEWABLE ENERGY	Course Type: Theory
Course Code: 23GPN2		
Total Hours: 30	Hours/Week: 2	Credits: 2
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy	Dr. H. Adline Mahiba	Dr. B.S. Benila
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CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Identify the world as a reserve of commercial energy sources, compare various forms of energy and analyse the merits and demerits of conventional and non-conventional energy sources	8[20]	5,6,9,10	R, U	P
CLO-2	Give emphasis on solar energy and to utilize various non-conventional energy sources as useful energy sources	8[20]	5,6,9,10	U	P
CLO-3	Describe the biomass conversion process, their applications and to analyse the advantage and disadvantage of biomass as energy source	8[20]	5,6,9,10	Ap, An	P
CLO-4	Give emphasis on various energy sources like Geothermal energy, wind energy and ocean energy and to utilize these energy sources for various applications	8[20]	5,6,9,10	An, E	P

CLO-5	Justify energy consumption and conservation principles in various sectors as well as give opinion for possible solutions to face energy crisis.	8[20]	5,6,9,10	U, Ap	P, M
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Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	CONVENTIONAL ENERGY SOURCES					
1.1	World's reserve of commercial energy sources and their availability	0.5	1[10]	GD	MCQ	1
1.2	Various forms of energy	0.5	1[10]	Le c	Ess	1
1.3	Renewable energy system	0.5	1[10]	Le c	SA	1
1.4	Non – renewable energy system	0.5	1[5]	Le c	SA	1
1.5	Comparison	0.5	1[10]	GD	Ess	1
1.6	Coal – Availability, Statistical details, Applications, Merits and demerits	0.5	1[15]	Le c	Ess	1
1.7	Oil - Availability, Statistical details, Applications, Merits and demerits	0.5	1[15]	Le c	Ess	1
1.8	Natural gas - Availability, Statistical details, Applications, Merits and demerits	0.5	1[15]	Le c	Ess	1
II	SOLAR ENERGY SOURCE					
2.1	Renewable energy sources	0.5	2[10]	GD	Qui	2, 4
2.2	Solar energy	0.5	2[5]	Le c	SA	2, 4
2.3	Nature of solar radiation	0.5	2[5]	Le c	SA	2, 4
2.4	Components	1	2[5]	Le c	SA	2, 4
2.5	Solar heaters	0.5	2[10]	Le c	Ess	2, 4
2.6	Crop dryers	0.5	2[10]	Le c	Ess	2, 4
2.7	Space cooling	1	2[10]	Le c	MC R	2, 4
2.8	Solar ponds	0.5	2[10]	Le c	Ess	2, 4

2.9	Solar cookers	0.5	2[10]	Le c	SA	2, 4
2.10	Water desalination	1	2[10]	Le c	Ess	2, 4
2.11	Photovoltaic generation basics	0.5	2[5]	Le c	Ess	2, 4
2.12	Merits and demerits of solar energy	1	2[10]	G D	SA	2, 4
III	ENERGY FROM BIOMASS					
3.1	Biomass energy	1	3[10]	Le c	Ess	1
3.2	Classification	0.5	3[15]	Le	Ess	1
3.3	Photosynthesis	0.5	3[10]	G D	Qui	1
3.4	Biomass conversion process	1	3[15]	Le c	Ess	1
3.5	Gobar gas plants	0.5	3[15]	G D	Ess	1
3.6	Wood gasification	1	3[10]	Le c	SA	1
3.7	Ethanol from wood	0.5	3[10]	Le c	Ess	1
3.8	Advantage and disadvantages of biomass as energy source	1	3[15]	G D	SA	1
IV	ENERGY FROM EARTH, WIND AND OCEAN					
4.1	Geothermal energy	1	4[10]	Le c	Ess	1
4.2	Wind energy	1	4[15]	Le c	Ess	1
4.3	Ocean Thermal Energy Conversion (OTEC)	1	4[15]	Le c	Ess	1
4.4	Energy from waves and tides	1	4[10]	Le c	Ess	1
4.5	Basic ideas	0.5	4[10]	G D	MC Q	1
4.6	Nature	0.5	4[10]	Le c	Ess	1
4.7	Applications	1	4[10]	Le c	Ess	1
4.8	Merits	0.5	4[10]	G D	SA	1
4.9	Demerits	0.5	4[10]	G D	SA	1
V	ENERGY STORAGE AND IMPACTS OF NON - CONVENTIONAL ENERGY					

5.1	Conservation of energy	0.5	5[10]	G D	SA	3
5.2	Patterns of energy consumption: Domestic, industrial, transportation, agricultural sectors	0.5	5[15]	Le c	Ess	3
5.3	Conservation principles in these sectors	0.5	5[15]	G D	SA	3
5.4	Energy crisis and possible solutions	0.5	5[15]	Le c	SA	3
5.5	Energy options for the developing countries	1	5[10]	Le c	Ess	3
5.6	Energy storage and hydrogen as a fuel (basics)	0.5	5[10]	Le c	Ess	3
5.7	Impact due to non-conventional energy sources	0.5	5[15]	G D	Ess	3
5.8	Global warming	1	5[10]	G D	Ess	3

BOOKS FOR REFERENCE:

1. G.D. Rai, Non - Conventional Energy Sources, Fourth edition, Khanna, 1997.
2. S. Rao and B.B. Parulekar, Energy Technology, Second edition, Khanna, 1997.
3. A.K. Wakil, Power Plant Technology, Tata McGraw Hill, 1993.
4. S.P. Sukhatme, Solar Energy, Tata McGraw-Hill Publishing Co. Edition II, 1997.

SEMESTER – VI

Course Title:	DIGITAL ELECTRONICS	Course Type: Theory
Course Code: 23GP61		
Total Hours: 90	Hours/Week: 6	Credits: 5
Pass-Out Policy : Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy	Dr. B.S. Benila	Dr. D. Hudson Oliver
Asso. Prof., Faculty	Asso. Prof. of Physics	Assi. Prof. of Physics
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CLO- No.	Course Learning Outcome Upon completion of this course, students will be able to:	PLO % MAPPED WITH CLO	CLO & PLO APPED WITH GA	Cognitive Level CL	Knowledge Category KC
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CLO-1	Understand the number system and gates	2[10] 4[10]	1,2,7,10	U	F
CLO-2	Design simple arithmetic and combinational circuits	2[10] 4[10]	1,2,7,10	U, Ap	C, F
CLO-3	Construct and understand the timing circuits and flip flops	2[10] 4[10]	1,2,7,10	Ap, An	C, P
CLO-4	Design and organize registers, counters and digital memories	2[10] 4[10]	1,2,7,10	U, An	F, M
CLO-5	Analyse the treatment of digital electronics in various integrated circuits	2[10] 4[10]	1,2,7,10	U, Ap	P,M

Module	Course Description	Hours	% CLO Mapping with Module	Learning Activities	Assessment Tasks	Ref.
I NUMBER SYSTEM & GATES						
1.1	Decimal, binary, octal, hexadecimal numbers systems and their conversions	2	1[10]	TPS	Qui	2
1.2	codes: BCD, gray and excess-3 codes –code conversions	2	1[10]	Lec	SA	1
1.3	complements (1's, 2's, 9's and 10's)	1	1[8]	Lec	Ess	1
1.4	Digital operation – Binary addition	1	1[8]	GD	SA	2
1.5	Binary subtraction - 1's & 2's complement methods	2	1[10]	GD	Sem	2
1.6	Boolean Algebra – De-Morgan's theorem	1	1[8]	TPS	Pro	1
1.7	Fundamentals of Logic Gates - basic logic gates	1	1[10]	Lec	SA	1
1.8	Universal logic gates (NAND & NOR)	1	1[10]	Lec	Sem	1
1.9	Realization of Boolean functions using gates	1	1[7]	Lec	Qui	
1.10	Standard representation of logic functions (SOP & POS)	1	1[9]	Lec	Pro	1
1.11	Minimization techniques (Karnaugh map: 2, 3, 4 variables)	2	1[10]	GD	Pro	1
II ARITHMETIC AND COMBINATIONAL CIRCUITS						
2.1	Adders - Half & Full adder	1	2[10]	TPS	Qui	2
2.2	The adder – subtractor	2	2[10]	Lec	Ess	1
2.3	parallel binary adder	1	2[8]	CL	Ess	2
2.4	BCD adder	2	2[8]	CL	Ess	1
2.5	Parity – Parity checkers and generators	1	2[7]	Lec	SA	1
2.6	2's Compliment – Adder and Subtractor	2	2[10]	CL	Ass	1
2.7	multiplexers (4:1) & demultiplexers (1:4)	1	2[8]	GD	Ess	1
2.8	encoder (8-line-to-3- line) and decoder (3-line-to-8-line)	1	2[10]	Lec	Ass	1
2.9	BCD to decimal decoders	1	2[10]	PT	Ess	2

2.10	seven segment decoders	1	2[8]	TPS	Ass	2
2.11	magnitude comparator	1	2[9]	GD	Ess	2
III TIMING CIRCUITS AND FLIP FLOPS						
3.1	Clock waveforms – Synchronous & Asynchronous operation	1	3[8]	Lec	Qui	1
3.2	IC 555 timer – Description	1	3[7]	PT	SA	1
3.3	555 Timer – Astable Multivibrator	2	3[8]	TPS	Pro	1
3.4	555 Timer – Monostable Multivibrator	1	3[8]	GD	SA	1
3.5	Schmitt trigger	1	3[7]	Lec	Sem	1
3.6	Flip Flops - RS flip flop	1	3[8]	Lec	SA	1
3.7	Clocked RS flip flop	1	3[7]	CL	Ess	1
3.8	D flip flop	1	3[6]	Lec	SA	1
3.9	Edge triggered D flip flop	1	3[6]	GD	SA	1
3.10	Flip flop timing	1	3[9]	Lec	Pro	1
3.11	JK flip flop	1	3[9]	Lec	SA	1
3.12	JK master slave flip flop	2	3[9]	GD	Sem	1
3.13	Edge triggered T flip flop	1	3[8]	Lec	Ess	1
IV REGISTERS, COUNTERS AND MEMORY DEVICES						
4.1	Registers – Shift Registers – Types	1	4[7]	Lec	MCQ	2
4.2	Serial In Serial Out (SISO) and Serial In Parallel Out (SIPO) Shift Registers	1	4[7]	GD	Ess	2
4.3	Parallel In Serial Out (PISO) and Parallel In Parallel Out (PIPO) Shift Registers	1	4[6]	CL	SA	2
4.4	Bidirectional Shift Register	1	4[7]	Lec	Sem	2
4.5	Asynchronous Counters - Ripple counter	1	4[7]	GD	Ess	1
4.6	Asynchronous down counter	1	4[6]	Lec	Ess	1
4.7	3 – bit asynchronous up-down counter	1	4[7]	Lec	Sem	1
4.8	Synchronous counter	1	4[7]	CL	Ass	1
4.9	Non binary counter (Mod – 3 & Mod – 6)	1	4[7]	Lec	Sem	1
4.10	Decade counter	1	4[6]	Lec	SA	1
4.11	Ring counter	1	4[6]	Lec	Sem	1
4.12	Memories - Basic terms and ideas	1	4[7]	GD	Ess	1
4.13	Magnetic memory & Optical memory	1	4[7]	CL	SA	1
4.14	ROMs, PROMs, EPROMs	2	4[7]	Lec	Sem	1
4.15	RAMs	1	4[6]	GD	Ess	1
V INTEGRATED CIRCUITS						
5.1	Convertors – D/A & A/D conversion	1	5[8]	Lec	Qui	1
5.2	D/A converters – Weighted Resistor D/A converter	1	5[10]	Lec	SA	2
5.3	R-2R ladder D/A converter	1	5[8]	GD	Ess	2
5.4	A/D converter – Successive approximation A/D converter	2	5[10]	CL	Ess	2
5.5	Dual Slope A/D converter	1	5[10]	Lec	Sem	2
5.6	MOSFETs and CMOS	2	5[8]	BS	MCQ	1
5.7	TTL Devices – parameters	2	5[10]	Lec	SA	1
5.8	TTL NAND, NOR, AND and OR gates.	2	5[8]	Lec	SA	1
5.9	CMOS characteristics	2	5[10]	BS	MC Q	
5.10	CMOS NAND and NOR gates	1	5[10]	Lec	Ess	1
5.11	TTL to CMOS interface	1	5[8]	CL	Sem	1

BOOKS FOR REFERENCE:

1.2	Bond energy of NaCl molecule	1	1(5)	Lec	SA	1
1.3	Madelung constant of ionic crystals	1	1(10)	Lec	Ess	1
1.4	Born-Haber cycle	1	1(10)	Lec	SA	1
1.5	Properties of ionic solids	1	1(10)	Lec	Ess	1
1.6	Covalent bond	1	1(5)	GD	MCQ	1
1.7	Directional nature of a covalent bond	2	1(10)	GD	MCQ	1
1.8	Hybridization	1	1(5)	Lec	SA	1
1.9	Properties of covalent compounds	1	1(5)	Lec	Ess	1
1.10	Metallic bond	1	1(5)	Lec	SA	1
1.11	Properties of metallic crystals	1	1(10)	Lec	Ess	1
1.12	Hydrogen bonds	2	1(10)	GD	SA	1
1.13	Comparison between bonds	1	1(5)	Lec	Ess	1
II CRYSTAL PHYSICS						
2.1	Introduction about crystal parameters	1	2(10)	Lec	MCQ	1
2.2	Crystal systems	1	2(5)	Lec	SA	1
2.3	Show that fivefold rotation axis is not compatible with a lattice	1	2(5)	Lec	Ess	1
2.4	Simple cubic structure	1	2(10)	Lec	SA	1
2.5	Body centred cubic structure	1	2(5)	Lec	SA	1
2.6	Face centered cubic structure	1	2(5)	Lec	SA	1
2.7	Hexagonal close packed structure	2	2(5)	Lec	SA	1
2.8	Miller indices	1	2(10)	Lec	MCQ	1
2.9	Imperfections in crystals	1	2(5)	Lec	SA	1
2.10	Schottky defects and Frenkel defects	1	2(10)	Lec	Ess	1
2.11	Line imperfections	1	2(10)	Lec	SA	1
2.12	Screw dislocation	1	2(10)	Lec	SA	1
2.13	Burgers vector	1	2(5)	Lec	SA	1
2.14	Reciprocal lattice	1	2(5)	Lec	MCQ	1
III WAVE NATURE OF MATTER AND X-RAY DIFFRACTION						
3.1	Introduction	1	3(5)	GD	MCQ	2
3.2	De-Broglie hypothesis	1	3(10)	GD	SA	2
3.3	Relativistic correction	1	3(10)	Lec	Ess	2
3.4	Experimental study of matter waves	2	3(10)	Lec	Ess	2
3.5	The Davisson Germer experiment	1	3(10)	Lec	Ess	2
3.6	Heisenberg's uncertainty principle	1	3(10)	GD	SA	2
3.7	X-ray diffraction	1	3(10)	Lec	SA	2
3.8	Bragg's Law	1	3(10)	Lec	SA	2
3.9	Bragg's X-ray spectrometer	2	3(10)	Lec	Ess	2
3.10	Powder crystal method	1	3(5)	Lec	Ess	2
3.11	Rotating crystal method	1	3(5)	Lec	Ess	2
3.12	Problems	2	3(5)	GD	SA	2
IV ELECTRICAL PROPERTIES OF METAL						
4.1	Physical properties of metal	1	4(5)	Lec	SA	1
4.2	Classical theory of electric conduction	1	4(10)	Lec	SA	1
4.3	Drawbacks of classical theory	1	4(10)	Lec	Ess	1

4.4	Relation between electrical conductivity and thermal conductivity	1	4(10)	Lec	Ess	1
4.5	General characteristic of electrical conduction in metals	2	4(10)	Lec	SA	1
4.6	Resistivity of alloys	1	4(5)	Lec	SA	1
4.7	Thermal conductivity in metals	1	4(5)	Lec	SA	1
4.8	Hall effect	1	4(10)	Lec	SA	1
4.9	Magnetoresistance	1	4(5)	Lec	SA	1
4.10	Properties of low resistivity materials and their applications	1	4(10)	Lec	Ess	1
4.11	High resistivity materials and their applications	2	4(10)	Lec	MCQ	1
4.12	Kronig Penney model	1	4(5)	BS	Ess	1
4.13	Brioliouin zone in two dimension	1	4(5)	BS	MCQ	1
V MAGNETIC PROPERTIES OF MATERIALS						
5.1	Introduction	1	5(5)	GD	MCQ	1
5.2	Definition of magnetic permeability, Magnetization and Bohr magneton	1	5(10)	GD	SA	1
5.3	Dimagnetism	1	5(5)	GD	MCQ	1
5.4	Langevin theory in Diamagnetism	1	5(10)	Lec	Ess	1
5.5	Paramagnetism	1	5(10)	Lec	Ess	1
5.6	Classical theory of paramagnetism	1	5(5)	GD	MCQ	1
5.7	Quincke's method to determine Susceptibility	2	5(10)	Lec	Ess	1
5.8	Hund's rules	1	5(5)	GD	SA	1
5.9	Ferro magnetism	1	5(5)	GD	SA	1
5.10	Theory of ferro magnetism	1	5(10)	Lec	Ess	1
5.11	Ferro magnetic domains	1	5(10)	Lec	Ess	1
5.12	The domain model	1	5(5)	Lec	Ess	1
5.13	Explanation of Hysteresis	1	5(10)	Lec	Sa	1
5.14	Magnetic materials	1	5(5)	GD	Ess	1

BOOKS FOR REFERENCE

1. S.O. Pillai, Solid State Physics, New Age International Ltd., New Delhi, 2006
2. R. Murugesan, Kruthiga Sivaprasath, Modern Physics, S. Chand of Company Ltd., New Delhi.
3. C. Kittel, John Wiley and Sons, Introduction to Solid State Physics – 8th Ed., (1996)
4. H. Ibach and H. Luth, Solid State Physics, Springer (2004)
5. J.P. Srivastava, Elements of Solid State Physics, Printice Hall of India (2004).
6. Dr. K. Ilangovan, Solid State Physics, MJP Publishers, Chennai (2013).

Course Title:	NONELECTRONICS II	Course Type:	Practical VIII
		Course Code: 23GPP8	
Total Hours: 30	Hours/Week: 2	Credits: 1	
Pass-Out Policy :			
Minimum Contact Hours: 18			

Total Score %: 100		Internal: 40	External: 60
Minimum Pass %: 40		[No Minimum for Internal]	
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Hepzy Roy	Dr. C. Besky Job	Dr. B.S. Benila	
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Asso. Prof. of Physics	
+919944261881	+919487026024	+919843626563	
achroy66@gmail.com	cbjob1969@gmail.com	benjane.benila@gmail.com	

CLO-No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Catogory KC
CLO-1	The students will be able to use the different components and equipment in physics practical.	2[10] 6[10]	1,2,3	R, U	C
CLO-2	The students will have a good foundation in the fundamentals related to the experiments included in this course and their advanced applications.	2[10] 6[10]	1,2,3	U	F
CLO-3	The students will also able to work effectively and safely in the laboratory environment independently and as well as in teams.	2[10] 6[10]	1,2,3	Ap, An	F, P
CLO-4	The students will get motivated to develop small experiments related to these techniques and develop their physical understanding.	2[10] 6[10]	1,2,3	An, E	P
CLO-5	After completion of this course students will be able to design and carry out scientific experiments.	2[10] 6[10]	1,2,3	U, Ap	P, M

No	Description
1	To find wavelength and refractive indices of different spectral lines and Cauchy's constants using spectrometer.
2	To study the relationship between the angle of incidence i_1 and the angle of emergence i_2 for the given angle of deviation and to study the variation of angle of emergence with angle of incidence and to draw the i_1 - i_2 curve.
3	To form hyperbolic fringes and to find Young's modulus of the given glass plate
4	To find the unknown resistance of the given coil and temperature coefficient of the same coil using Carey Fosters bridge
5	To determine the capacitance used in the circuit using B.G
6	To determine the value of high resistance used in the circuit using B.G.
7	Using Biprism, find the wavelength of Sodium vapour lamp.
8	Using Owen's Bridge, find the self-inductance of 2 different coils having different turns in series & parallel mode

9	To calibrate voltage with the help of potentiometer and measure the small errors with the input voltage value and compare it by graphically.
10	Quincke's method to determine magnetic susceptibility of a paramagnetic substance
11	To find the Hall coefficient of the given semiconductor using Hall effect

Course Title:	ELECTRONICS II	Course Type: Practical IX
Course Code: 23GPP9		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. B.S. Benila	Dr. J.V. Bynaja
Asso. Prof., Faculty Head	Asso. Prof. of Physics	Assi. Prof. of Physics
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CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	To give knowledge of some basic electronic components and circuits.	2[10] 6[10]	1,2,3	R, U	P
CLO-2	To introduce basics of diode and transistor circuits	2[10] 6[10]	1,2,3	U	P
CLO-3	To understand working of some I C based circuits	2[10] 6[10]	1,2,3	Ap, An	F, P
CLO-4	To study logic gates and their usage in digital circuit s.	2[10] 6[10]	1,2,3	An, E	P
CLO-5	To expose the students to working of some power electronic dev ices, transducers and application of transducers.	2[10] 6[10]	1,2,3	U, Ap	P, M

No.	Description
1	To construct an astable multivibrator using IC 555 and to find the frequency of oscillation.
2	To construct half adder and full adder and to verify the truth table.
3	To construct integrator and differentiator using IC 741 and to trace the input and output waveforms.
4	To construct a sine wave generator using IC 741 and to find the frequency of oscillation.

5	To construct RS, D and JK flipflop and to verify their truth tables.
6	To construct Schmitt trigger and to measure the threshold voltage.
7	To construct basic logic gates using NAND and NOR gates only and to verify their truth tables.
8	To Construct single stage amplifier without feedback and to draw the frequency response.

Note : Use of digital balance and calculators are permitted.

Course Title:	COMPUTER PROGRAMMING IN JAVA	Course Type: Theory
Course Code: 23GPEB		
Total Hours: 90	Hours/Week: 6	Credits: 5
Pass-Out Policy : Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
Prof. A. Charles Hepzy Roy	Dr. S. Sharmila Juliet	Dr. J.V. Bynaja
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CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Develops program using object oriented methodology in Java.	3[10] 4[10]	1,2,7, 8,10	R, U	P
CLO-2	Apply Concept of inheritance, packages and interfaces for code reusability.	3[10] 4[10]	1,2,7, 8,10	U	P
CLO-3	Make use of exception handling mechanisms and multithreaded model to solve real world problems.	3[10] 4[10]	1,2,7, 8,10	Ap, An	F, P
CLO-4	Build Java applications with I/O packages, string classes, Collections and generics concepts.	3[10] 4[10]	1,2,7, 8,10	An, E	P
CLO-5	Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications.	3[10] 4[10]	1,2,7, 8,10	U, Ap	P, M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	INTRODUCTION TO OOP AND JAVA					

1.1	Overview of OOP	1	1[5]	Lec	SA, Ess	1
1.2	Object oriented programming paradigms	1.5	1[10]	Lec	SA, Ess	1
1.3	Features of Object Oriented Programming	1	1[10]	BS	MCQ, SA	1
1.4	Java Buzzwords	1	1[5]	GD	Qui, MCQ	1
1.5	Overview of Java	1	1[5]	Lec	SA	1
1.6	Data Types	1	1[5]	Lec	SA, Ess	1
1.7	Variables and Arrays	0.5	1[5]	SI	Pro	1
1.8	Operators	1	1[5]	BS	SA, MCQ	1
1.9	Control Statements	1	1[5]	Lec	SA, Ess	1
1.10	Programming Structures in Java	1	1[5]	Lec	SA, MCQ	1
1.11	Defining classes in Java	1	1[10]	Lec	SA, Ess	1
1.12	Constructors	1	1[10]	SI	SA, Pro	1
1.13	Methods	1	1[5]	BS, SI	SA, Pro	1
1.14	Access specifiers	1	1[5]	Lec	SA, MCQ	1
1.15	Static members	1	1[5]	SI	Pro	1
1.16	Java Doc comments	1	1[5]	Lec	SA	1
II INHERITANCE, PACKAGES AND INTERFACES						
2.1	Overloading Methods	1	2[10]	Lec	SA	2
2.2	Objects as Parameters	1	2[5]	BS	SA	2
2.3	Returning Objects	1	2[5]	SI	Pro	2
2.4	Static, Nested and Inner Classes.	1	2[10]	GD	SA, MCQ	2
2.5	Inheritance: Basics	1	2[5]	Lec	SA	2
2.6	Types of Inheritance	1	2[5]	SI	Pro	2
2.7	Super keyword	1	2[5]	Lec	SA, Ess	2
2.8	Method Overriding	1	2[5]	Lec	SA	2
2.9	Dynamic Method Dispatch	1	2[10]	Lec	SA, Ess	2
2.10	Abstract Classes	1	2[5]	SI	Pro	2
2.11	final with Inheritance	1	2[5]	Lec	SA	2
2.12	Packages and Interfaces:	1	2[10]	BS	SA	2
2.13	Packages	1	2[5]	Lec	SA	2
2.14	Packages and Member Access	0.5	2[5]	SI	Pro	2
2.15	Importing Packages	0.5	2[5]	SI	Pro	2

2.16	Interfaces.	1	2[5]	Lec	Pro	2
III EXCEPTION HANDLING AND MULTITHREADING						
3.1	Exception Handling basics	1	3[5]	Lec	SA	2
3.2	Multiple catch Clauses	1	3[10]	Lec	SA	2
3.3	Nested try Statements	1	3[5]	BS	SA	2
3.4	Java's Built-in Exceptions	1	3[5]	BS	SA	2
3.5	User defined Exception.	1	3[10]	Lec	SA	2
3.6	Multithreaded Programming: Java read Model	1	3[10]	Lec	SA	2
3.7	Creating a Thread and Multiple Threads	1	3[10]	BS	SA	2
3.8	Priorities	1	3[10]	GD	SA	2
3.9	Synchronization	1	3[5]	BS	SA,	2
3.10	Inter Thread Communication	1	3[10]	Lec	SA	2
3.11	Suspending	1	3[5]	SI	Pro	2
3.12	Resuming, and Stopping Threads	1	3[5]	SI	Pro	2
3.13	Multithreading. Wrappers	1	3[5]	SI	Pro	2
3.14	Auto boxing	1	3[5]	Ess	SA	1
IV I/O, GENERICS, STRING HANDLING						
4.1	I/O Basics	1	4[10]	Lec	SA	1
4.2	Reading and Writing Console I/O	1	4[10]	BS	SA	1
4.3	Reading and Writing Files.	0.5	4[10]	BS	SA	1
4.4	Generics:	1	4[10]	GD	SA	1
4.5	Generic Programming	0.5	4[10]	GD	Ass	1
4.6	Generic classes	1	4[10]	Lec	SA	1
4.7	Generic Methods	1	4[5]	LEc	SA	1
4.8	Bounded Types	1	4[5]	Lec	SA	1
4.9	Restrictions and Limitations.	2	4[10]	BS	Ess, Pro	1
4.10	Strings:	0.5	4[5]	SI	Pro	2
4.11	Basic String class	0.5	4[5]	SI	Pro, MPr	2
4.12	Methods	1	4[5]	SI	Pro, MPr	2
4.13	String Buffer Class.	1	4[5]	SI	Pro	2
V JAVA FX EVENT HANDLING, CONTROLS AND COMPONENTS						
5.1	JAVAFX Events and Controls:	1	5[10]	Lec	SA, Ess	1
5.2	Event Basics	1	5[5]	Lec	Ess	1
5.3	Handling Key and Mouse Events.	1	5[10]	BS	SA	1
5.4	Controls: Checkbox	1	5[5]	GD	SA	1
5.5	Toggle Button, Radio Buttons	1	5[10]	BS	SA, Ess	1
5.6	List View	1	5[5]	TPS	SA	1
5.7	Combo Box, Choice Box	1	5[10]	TPS	SA	1
5.8	Text Controls	1	5[5]	GD	SA	1
5.9	Scroll Pane.	1	5[5]	SI	Pro	1
5.10	Layouts	0.5	5[5]	SI	Pro	1
5.11	Flow Pane	0.5	5[5]	CS	MPr	1

5.12	HBox and VBox	1	5[5]	CL	Ess	2
5.13	Border Pane, Stack Pane, Grid Pane. Menus	1	5[10]	GD	Ess	2
5.14	Basics Menu:	1	5[5]	GT	SA	2
5.15	Menu bars & Menu Item	1	5[5]	OO	Sem	2

BOOKS FOR REFERENCE

1. Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi, 2019.
2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1 st Edition, McGraw Hill Education, New Delhi, 2015
3. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018.

Course Title:	COMPUTER PROGRAMMING IN JAVA	Course Type:	Practical X
Course Code: 23GPP10			
Total Hours: 30	Hours/Week: 2	Credits: 2	
Pass-Out Policy :			
Minimum Contact Hours: 18			
Total Score %: 100		Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Hepzy Roy	Dr. S. Sharmila Juliet	Dr. J.V. Bynaja	
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CLO- No.	Course Learning Outcomes <i>Upon Completions of this course, the students will be able to :</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Catogory KC
CLO-1	Knowledge of the structure and model of the Java programming language.	4[20]	1,2,7,10	R, U	P
CLO-2	Understand the basic concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.	4[20]	1,2,7,10	U	P
CLO-3	Identify packages, interfaces, applet and the relationships among them needed for a specific problem.	4[20]	1,2,7,10	Ap, An	F, P
CLO-4	Understand Java programming concepts and utilize Java Graphical use Interface in program writing.	4[20]	1,2,7,10	An, E	P
CLO-5	Demonstrate programs on exception handling, event handling and multithreading	4[20]	1,2,7,10	U, Ap	P, M

No	Description
1	Write a program to find the Period of oscillation of a simple pendulum

	using class
2	Write a program to read and display student's profile using inheritance concept (Name, Class, Reg. No, with Physical fitness)
3	Write a program to find total marks obtained by a student for two semesters using multilevel inheritance.
4	Write a program to find the maximum height, time of flight and range of a projectile using function without return statement.
5	Write a program to animate following shape using graphics and applets: 1. Lines & Rectangulars. 2. Circles and Ellipses
6	Write a program to find the Inverse and determinant of given matrices.
7	Write a program draw following shapes, graphics and applets: 1. Square inside a circle 2. Circle inside a square.
8	Write a program to add two complex numbers using Operator Overloading,
9	Write a program to add two matrices of order 3 x 3 and find the transpose of given matrix
10	Develop two separate program to find the factorial of a given numbers with and without return statement. (34! and 25!)

Course Title:	EMBEDDED SYSTEM	Course Type: Theory
Course Code:		
Total Hours: 30	Hours/Week: 2	Credits: 1
Pass-Out Policy :		
Minimum Contact Hours: 18		
Total Score %: 100	Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
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CLO No.	Expected Course Learning Outcome <i>Upon completion of this course, the students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Catogory KC
CLO-1	Learn about the basic concepts Microcontroller and its architecture.	4[10] 7[10]	1,2,7, 10	R, E	P
CLO-2	Develop skills to Programme microcontroller 8051 by knowing instruction set.	4[10] 7[10]	1,2,7, 10	Ap	P
CLO-3	Gain knowledge about ports and Timers in microcontroller	4[10] 7[10]	1,2,7, 10	R, Ap	F, P

CLO-4	Learn about various concepts of embedded systems using software and their interfacing	4[10] 7[10]	1,2,7, 10	U	P
CLO-5	Acquire the knowledge in programming in embedded systems and apply it to RTOS	4[10] 7[10]	1,2,7, 10	R, An	P, M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	MICROCONTROLLER ARCHITECTURE					
1.1	Introduction	1	1	LEC	MCQ	1
1.2	Features of 8051 Microcontroller	1	1	GD	SA	1
1.3	Architecture of 8051- CPU-Registers-Pointers	1	1	LEC	ESS	1
1.4	Counter-Flag Bits- Special Function Registers	1	1	GT	ESS	1
1.5	Pin description of 8051	1	1	TPS	SEM	1
1.6	Internal RAM organization	1	1	LEC	ASS	1
1.7	Stack and Stack pointers	1	1	GT	ESS	1
II	INSTRUCTION SET AND PROGRAMMING					
2.1	Addressing modes of 8051	1	2	LEC	MCQ	1
2.2	Data transfer instructions	1	2	LEC	SA	1
2.3	Byte & Bit level logical instructions	1	2	GD	ESS	1
2.4	Arithmetic instructions	1	2	GT	SA	1
2.5	Rotate and swap instructions	1	2	GD	ASS	1
2.6	Jump & Call instructions	1	2	TPS	ESS	1
III	PARALLEL PORTS- TIMERS- SERIAL PORTS -INTERRUPTS					
3.1	I/O Port structure	1	3	LEC	MCQ	1
3.2	I/O Bit manipulation programming- examples	1	3	GT	PRO	1
3.3	Programming I/O ports using 8051C	1	3	LEC	SA	1
3.4	Logical operations in 8051C	1	3	TPS	ESS	1
3.5	Any 4 Programme	1	3	GD	PRO	1
3.6	8051 timer modes & programming	1	3	LEC	ESS	1
3.7	8051 counter programming	1	3	EL	SEM	1
IV	EMBEDDED C PROGRAMMING					
4.1	External Programme memory	1	4	LEC	MCQ	1
4.2	External Data Memory	1	4	GT	SA	1
4.3	Memory Address Decoding	1	4	LEC	ESS	1
4.4	Key board interfacing- using hardware	1	4	GD	ASS	1

4.5	Using software	1	4	TPS	SEM	1
4.6	LED interfacing	1	4	LEC	ESS	1
4.7	Multiplexed 7 segment display interfacing	1	4	EL	ESS	1
V	PROGRAMMING EMBEDDED SYSTEMS IN C					
5.1	Introduction	1	5	LEC	MCQ	1
5.2	Need for RTOS	1	5	LEC	SA	1
5.3	Characteristics and Qualities of a Good RTOS	1	5	GD	SA	1
5.4	Multiple tasks & processes	1	5	LEC	ESS	1
5.5	Process state & schedule	1	5	GT	ESS	1
5.6	Scheduling policies	1	5	LEC	SEM	1
5.7	Priority based scheduling Policies- Earliest -Deadline- First scheduling	1	5	TPS	ASS	1
5.8	Rate Monotonic scheduling	1	5	EL	PRO	1

BOOKS FOR REFERENCE:

1. I.A. Dhotre, A.P. Godse., 2023, Embedded systems & IoT, 1st edition, Technical Publications, Pune

Course Title: Value Added Course IV **Environmental Science**

Course Type: **Theory**

Total Hours: 30 Hours/Week: 2 Credit: 1

Course Code: **23SE41**

Pass-Out Policy: Minimum Contact Hours: 18
Total Score %: 100 Internal: 40 External: 60
Minimum Pass %: 40 [No Minimum for Internal]

Course Creator

Expert 1

Expert II

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CLO- No.	Course Learning Outcomes <i>Upon completion of this course, students will be able to:</i>	% of PLO Mapping with CLO	CLO & PLO Mapped with GA#	Cognitive Level (CL)	Knowledge Category (KC)
CLO-1	understand the various environmental attributes	2(4), 3(4) 4(4), 5(3), 8(2)	GA4	U	F
CLO-2	evaluate the impacts of over-exploitation and degradation of natural resources	7(8), 8(3), 2(4)	GA 4	An	C
CLO-3	remember various global environmental issues	1(5), 2(5), 10(5)	GA 8	E	P

CLO-4	create emphasis on energy conservation and need for sustainable development	7(6), 2(6),	GA 9	Ap	M
CLO-5	create substantial goals for sustainable development	4(10), 10(5)	GA 10	C	M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
1.1	Definition, scope and importance	1	1[25]	SI	ST	1
1.2	Multidisciplinary nature of environmental studies	1	1[25]	KW L	ST	1
1.3	Need for public awareness	1	2[25]	Sem	ST	1
1.4	Concept of sustainable development	1	5[25]	GD	ST	1
2.1	Renewable and non-renewable resources	1	1[25]	Lec	CT	1
2.2	Land resources, forest resources, water resources	1	1[25]	Lec	HoA	1
2.3	Mineral resources, energy resources, food resources	1	1[25]	Lec	HoA	1
2.4	Conservation of resources	1	1[25]	RP	HoA	1
3.1	Ecosystem: Concept, structure and function	2	1[25]	BS	MCQ	2
3.2	Food chains, food webs and energy flow in an ecosystem	2	1[25]	Lec	MCQ	2
3.3	Biodiversity: Definition, value, levels of biological diversity and mega-diversity centers	2	1[13] 2[12]	BS	OBT	2
3.4	Endangered and endemic species of India.	2	2[25]	Sem	OBT	2

	Threats and conservation of biodiversity					
4.1	Environmental pollution: Air, water, soil and noise pollution- causes, effects and controls	2	1[12] 2[13]	Sem	SA	3
4.2	Solid waste management, control measures of urban and industrial waste	2	4[25]	CS	Qui	3
4.3	Disaster management: Floods, earthquake, cyclone and landslides	2	4[25]	CS	Qui	3
4.4	Environmental policies and practices	1	5[25]	Rep	HoA	3
5.1	Clean energy technologies	2	2[25]	GT	MCQ	3
5.2	Bio-energy and conversion systems	2	3[25]	FW	OT	3
5.3	Green building with eco-friendly materials	2	4[25]	MPr	OBT	3
5.4	Zero waste management	1	4[12] 5[13]	SP	HoA	3

Reference Books

1. Sharma, P. D. 2009. *Ecology and Environment*, Rastogi Publication, India.
 2. Barthwl, R. R. 2002. *Environmental Impact Assessment*, New Age International Publishers, New Delhi, India.
- United Nations Environment Programme (UNEP). 1995. *Global Biodiversity Assessment*, Cambridge University Press

Course Title:	PRINCIPLES OF HOME APPLIANCES	Course Type: Theory
Course Code: 23GPN3		
Total Hours: 30	Hours/Week: 2	Credits: 2
Pass-Out Policy : Minimum Contact Hours: 18 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]		
Course Creator:	Expert 1:	Expert 2:
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CLO No.	Expected Course Learning Outcome <i>Upon completion of this course, the students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	understand where all physics principles have been put to use in daily life	8[20]	1,2,5,7	R, U	C, P
CLO-2	Appreciate the concepts with a better understanding and knowledge	8[20]	1,2,5,7	U, Ap An	P, M
CLO-3	Skills to service, troubleshoot and repair of domestic home appliances	8[20]	1,2,5,7	An, E	P, M
CLO-4	Idea to operate all the electrical meters with measuring skills	8[20]	1,2,5,7	R, An C	P
CLO-5	dismantle & test different components of an appliance using appropriate tools and measuring instruments	8[20]	1,2,5,7	U Ap An	M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I ELECTRIC BULBS						
1.1	Heating Elements	1	1[20]	Lec	SA	1
1.2	Principle of Electric Lamps	1	1[10]	Lec	Ess	1
1.3	Incandescent Lamp	1	1[10]	BS	SA	1
1.4	Fluorescent Lamp	1	1[20]	GD	Ess	1
1.5	CFL Lamp	1	1[20]	Lec	SA	1

1.6	LED	1	1[20]	Lec	Ess	1
II HEATING APPLIANCES						
2.1	Electric Iron	1	2[20]	Lec	SA	2
2.2	Hair Dryer	1	2[20]	BS	SA	2
2.3	Electric Heater	1	2[10]	SI	Pro	2
2.4	Hot Plate	1	2[10]	GD	SA	2
2.5	Induction Stove	1	2[20]	Lec	SA	2
2.6	Microwave Oven	1	2[20]	SI	Pro	3
III HOME APPLIANCES I						
3.1	Electric Fan	1	3[20]	Lec	SA	2
3.2	Vaccum Cleaner	1	3[20]	Lec	SA	3
3.3	Air Conditioner	1	3[20]	BS	SA	2
3.4	Water Heater	1	3[20]	BS	SA	2
3.5	Televisiion	1	3[20]	Lec	SA	2
IV HOME APPLIANCES II						
4.1	Refrigerator	1	4[20]	Lec	SA	3
4.2	Inverter	1	4[20]	BS	SA	1
4.3	Washing Machine	0.5	4[20]	BS	SA	1
4.4	Dish Washer	1	4[20]	GD	SA	1
4.5	Air Cooler	0.5	4[10]	GD	Ass	1
4.6	Solar Water Heater	1	4[10]	Lec	SA	1
V TYPES OF DIGITAL CAMERA						
5.1	Dome CCTV Camera	1	5[20]	Lec	Ess	4
5.2	Night Vision CCTV Camera	1	5[10]	Lec	Ess	4
5.3	Fisheye CCTV Camera	1	5[20]	BS	SA	4
5.4	License Plate Recognition Camera	1	5[10]	GD	SA	4
5.5	Box Security Camera	1	5[10]	BS	Ess	4
5.6	Pan tilt Zoom CCTV Camera	1	5[20]	TPS	SA	4
5.7	Wireless CCTV Camera	1	5[10]	TPS	SA	4

BOOKS FOR REFERENCE

1. The Physics in our daily lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019.
2. For the love of Physics, Walter Lawin, Free Press, New York, 2011.
3. Amwani and M.L. Anwani, Basic Electrical Engineering, Dhanpat Rai & Co. Pvt. Ltd. New Delhi (2003).
4. Herman Kruegle, CCTV Surveillance, Elsevier Science Publications, (2011).
5. S.P. Bali, Consumer Electronics, Pearson Education, India (2005).
6. Princeton Energy Resources International, Handbook of International Electrical Safety Practices, John Wiley & Sons (2011).

Course Title:	LASER AND OPTOELECTRONICS		Course Type: Theory
			Course Code: 23GPEC
Total Hours: 90	Hours/Week: 6	Credits: 5	
Pass-Out Policy :			
Minimum Contact Hours: 54			
Total Score %: 100		Internal: 40	External: 60
Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
Prof. A. Charles Hepzy Roy	Dr. J.V. Bynaja	Dr. C. Besky Job	
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand the principle of laser and the basic concepts.	7[10] 10[10]	1,2,5,6, 7,10	U	F
CLO-2	Explain in detail about the different type of lasers with their description, structure, working and uses.	7[10] 10[10]	1,2,5,6, 7,10	E	C
CLO-3	Analyse the operation of display devices such as LEDs, plasma display,	7[10] 10[10]	1,2,5,6, 7,10	An	C, P
CLO-4	Identify the optical sources, detectors and to apply the gained knowledge in their everyday life.	7[10] 10[10]	1,2,5,6, 7,10	Ap	P
CLO-5	Recognize and classify the structure of optical fibres and their different types of losses.	7[10] 10[10]	1,2,5,6, 7,10	R	M

Module	Course Description	Hours	% CLO mapping with Module	Learning Activities	Assessment Tasks	Ref.
I	BASIC PRINCIPLES OF LASER					
1.1	LASER-Introduction	0.5	1[10]	GD	SA	2
1.2	Emission and absorption of radiation- Spontaneous and stimulated emission	0.5	1 [10]	Lec	SA	2
1.3	Einstein relations	1	1 [10]	Lec	Ess	2
1.4	Absorption of radiation	1	1 [10]	Lec	Ess	2
1.5	Population inversion and attainment of population inversion	1	1 [10]	GD	SA	2

1.6	Line shape function: (i) Spectral broadening (ii) Doppler broadening (iii) Collision broadening (iv) Natural damping	2	1 [10]	Lec	Ess	2
1.7	Broadening Mechanisms	1	1 [10]	Lec	Ess	2
1.8	Population Inversion and pumping threshold conditions	1.5	1 [10]		Ess	2
1.9	Laser modes: Axial modes	0.5	1 [10]	Lec	SA	2
1.10	Transverse modes	1	1 [10]	Lec	SA	2
II CLASSIFICATION OF LASERS						
2.1	Solid State Laser: Ruby laser - General description, structure, working	1	2 [10]	Lec	Sem	1
2.2	Nd Glass laser - general description and uses	0.5	2 [10]	Lec	SA	1
2.3	Tunable Solid State Lasers: Alexandrite Laser - General description, structure, working	1	2 [10]	Lec	Ess	1
2.4	Titanium - Sapphire laser, general description	1	2 [10]	Lec	SA	1
2.5	Fiber laser - general description	0.5	2 [5]	PT	SA	1
2.6	Gas lasers: He-Ne laser - general description, structure, working	1	2 [10]	Lec	Ess	1
2.7	CO ₂ laser - general description, energy levels of CO ₂ molecule structure, working	1	2 [10]	PT	Ess	1
2.8	Wave guide laser - gas-dynamic laser, TE CO ₂ lasers	0.5	2 [5]	Lec	SA	1
2.9	Tunable dye lasers, Liquid dye laser	1	2 [10]	Lec	Sem	1
2.10	Semiconductor laser - basic laser structure	0.5	2 [10]	Lec	SA	1
2.11	Homo-junction semiconductor laser - general description, diode laser operation	1	2 [10]	Lec	Ess	1
2.12	Hetero-junction lasers - general description, SH laser, DH laser	1	2 [10]	Lec	Ess	1
III DISPLAY DEVICES						
3.1	Luminescence - Types of luminescence, Fluorescence, phosphors, activators, coactivators	1	3 [10]	Lec	Ess	2
3.2	Characteristic and non-characteristic luminescence	1	3 [10]	Lec	SA	2
3.3	Photoluminescence	1	3 [10]	PT	Ess	2
3.4	Electroluminescence - a.c powder, d.c powder device	1	3 [10]	PT	Sem	2
3.5	Injection luminescence and the light emitting diode	1	3 [10]	Lec	Ess	2
3.6	Introduction - Minority carrier	1	3 [10]	Lec	Ess	2

	injection, quantum efficiency, emission wavelength					
3.7	LED materials	0.5	3 [5]	Lec	SA	2
3.8	LED construction - Quantum efficiency, fraction of total generated radiation (F), methods to reduce reflection losses	1.5	3 [10]	Lec	Ess	2
3.9	Response times of LED's	1	3 [10]	Lec	SA	2
3.10	LED drive circuitry	0.5	3 [5]	Lec	SA	2
3.11	Plasma displays	0.5	3 [5]	Q	Sem	2
3.12	Photo Transistor	0.5	3 [5]	Q	Sem	2
IV PHOTO DETECTORS						
4.1	Thermal detectors-Explanation	0.5	4 [10]	GD	SA	2
4.2	Thermo-electric detectors; Bolometer, pneumatic detector, pyroelectric detector	2	4 [10]	Q	Ess	2
4.3	Photon devices	1	4 [10]	Lec	SA	2
4.4	Photo emissive devices	1	4 [10]	Lec	Sem	2
4.5	Photo multipliers-Four types of photomultiplier dynode configuration	2	4 [10]	Lec	Ess	2
4.6	Noise in photomultipliers - Dark current, shot noise, multiplication noise, Johnson noise	1	4 [10]	Lec	Ess	2
4.7	Junction detectors - Photodiodes	0.5	4 [10]	Lec	SA	2
4.8	Photovoltaic mode, solar cell	1	4 [10]	PT	Ess	2
4.9	Photoconductive mode	0.5	4 [10]	Q	SA	2
4.10	Phototransistors	1	4 [10]	Lec	Sem	2
V FIBER OPTICAL WAVE GUIDES						
5.1	Introduction-Attenuation	0.5	5 [5]	TPS	SA	2
5.2	Total internal reflection	1	5 [10]	Lec	Ess	2
5.3	Phase shift on reflection	1	5 [10]	Lec	Ess	2
5.4	Field penetration into less dense medium	1	5 [5]	Lec	Ess	2
5.5	Classification of fiber based on (i) material (ii) no. of modes	0.5	5 [5]	Lec	SA	2
5.6	Optical fiber waveguides-Based on refractive index profile	0.5	5 [5]	Lec	SA	2
5.7	Step index fibers- Acceptance angle, numerical aperture, V-parameter, number of modes	1	5 [10]	Lec	Ess	2
5.8	Intermodal dispersion	0.5	5 [5]	Lec	SA	2
5.9	Single mode fibers	0.5	5 [5]	GD	SA	2
5.10	Graded index fibers	1.5	5 [10]	Lec	SA	2
5.11	Low dispersion fiber (i) material dispersion (ii) Wave guide dispersion	1	5 [10]	Lec	Ess	2
5.12	Losses in fibers; (i) Bending losses, (ii) Intrinsic fiber loss (a) scattering loss, (b) absorption loss	1	5 [10]	PT	Sem	2

5.13	Fiber Cables	1	5 [10]	Q	Sem	2
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BOOKS FOR REFERENCE:

1. Ajoy Ghatak, K. Thiagarajan, Optical Electronics, Cambridge University Press, 2004.
2. B.B. Laud, Lasers and non-linear optics, Second edition, 1991
3. M.N. Avadhanulu, An Introduction to Lasers theory and Applications, S.Chand & Company, New Delhi, 2008.
4. J. Wilson & J.F.B. Hawkes, Opto Electronics an Introduction, Prentice Hall, Second edition, India, 1989.

Course Title:	MEDICAL PHYSICS	Course Type:	Theory
Course Code: 23GPED			
Total Hours: 90	Hours/Week: 6	Credits: 5	
Pass-Out Policy : Minimum Contact Hours: 54 Total Score %: 100 Internal: 40 External: 60 Minimum Pass %: 40 [No Minimum for Internal]			
Course Creator:	Expert 1:	Expert 2:	
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CLO- No.	Course Learning Outcome <i>Upon completion of this course, students will be able to:</i>	PLO % MAPPED WITH CLO	CLO & PLO MAPPED WITH GA	Cognitive Level CL	Knowledge Category KC
CLO-1	Understand the mechanics of the body and physics of locomotor	3[10] 8[10]	1,2,5,6, 8,9,10	U	C
CLO-2	Analyse the acoustic, optical and electrical system of the body	3[10] 8[10]	1,2,5,6, 8,9,10	E	P
CLO-3	Apply the X-Ray and other radiation in diagnostic and therapeutic systems.	3[10] 8[10]	1,2,5,6, 8,9,10	An	C, F
CLO-4	Analyse the application of radiation in imaging and oncology studies	3[10] 8[10]	1,2,5,6, 8,9,10	Ap	F, P
CLO-5	Analyse the effects of radiation and its protective measures	3[10] 8[10]	1,2,5,6, 8,9,10	R	P

Module	Course Description	Hours	% CLO Mapping with Module	Learning Activities	Assessment Tasks	Ref.
I PHYSICS OF THE BODY-I						
1.1	Basic Anatomical Terminology: Standard Anatomical Position, Planes.	2	1[10]	TPS	Qui	1
1.2	Familiarity with terms like- Superior, Inferior, Anterior, Posterior, Medial, Lateral, Proximal and Distal.	2	1[8]	Lec	SA	1
1.3	Mechanics of the body: Skeleton, forces, and stability.	1	1[8]	Lec	Ess	1
1.4	Muscles and dynamics of body movement.	1	1[8]	GD	SA	1
1.5	Physics of Locomotor Systems: joints and levers,	1	1[8]	GD	Sem	1
1.6	Stability and Equilibrium.	1	1[8]	TPS	Pro	1
1.7	Energy metabolism of the body: Energy balance in the body	1	1[10]	Lec	SA	1
1.8	Energy consumption of the body	1	1[8]	Lec	Sem	1
1.9	Heat losses of the body, Thermal Regulation	1	1[7]	Lec	Qui	1
1.10	Pressure system of body	1	1[9]	Lec	Pro	1
1.11	Physics of breathing	1	1[8]	GD	Pro	1
1.12	Physics of cardiovascular system. Basics of	2	1[8]	TPS	Pro	1
II PHYSICS OF THE BODY-II						
2.1	Acoustics of the body: Nature and characteristics of sound	2	2[15]	TPS	Qui	1
2.2	Production of speech	2	2[14]	Lec	Ess	1
2.3	Physics of the ear,	1	2[15]	CL	Ess	1
2.4	Diagnostics with sound and ultrasound.	2	2[14]	CL	Ess	1
2.5	Optical system of the body: Physics of the	2	2[14]	Lec	SA	1
2.6	Electrical system of the body: Physics of the nervous system	2	2[14]	CL	Ass	1
2.7	Electrical signals and information transfer.	2	2[14]	GD	Ess	1
III PHYSICS OF DIAGNOSTIC AND THERAPEUTIC SYSTEMS-I						
3.1	X-Rays: Electromagnetic spectrum	2	3[7]	Lec	Qui	1
3.2	Production of X-rays	1	3[7]	PT	SA	1
3.3	Characteristic X-ray, X-ray spectra	2	3[7]	TPS	Pro	1
3.4	Types of X-Ray Generator	1	3[8]	GD	SA	1
3.5	Exposure timers and switches	1	3[7]	Lec	Sem	1
3.6	Radiation Physics: Radiation units exposure	1	3[7]	Lec	SA	1
3.7	Absorbed dose, units: rad, gray, relative biological effectiveness,	2	3[7]	CL	Ess	1
3.8	Effective dose- Rem & Sievert	1	3[6]	Lec	SA	1
3.9	Inverse square law	1	3[6]	GD	SA	1
3.10	Interaction of radiation with matter: Compton & photoelectric effect,	1	3[8]	Lec	Pro	1
3.11	Linear attenuation coefficient.	1	3[8]	Lec	SA	1
3.12	Radiation Detectors: ionization chamber	1	3[7]	GD	Sem	1

3.13	Geiger Muller counter	1	3[8]	Lec	Ess	1
3.14	Solid-State detectors, TFT.	2	3[6]	Lec	Sem	1
IV MEDICAL IMAGING AND RADIATION ONCOLOGY PHYSICS						
4.1	X-ray diagnostics and imaging,	2	4[7]	Lec	MCQ	3
4.2	Physics of nuclear magnetic resonance (R), NMR imaging	2	4[7]	GD	Ess	3
4.3	MRI Radiological imaging,	1	4[6]	CL	SA	3
4.5	Ultrasound imaging	1	4[7]	Lec	Sem	3
4.6	Physics of Doppler with applications and modes	1	4[7]	GD	Ess	3
4.7	Vascular Doppler.	1	4[6]	Lec	Ess	3
4.8	Radiography: Filters, grids, cassette, X-ray	1	4[7]	Lec	Sem	1
4.9	film processing, fluoroscopy	1	4[7]	CL	Ass	3
4.10	Computed tomography scanner- principle function, display, generations	1	4[7]	Lec	Sem	3
4.11	mammography	1	4[6]	Lec	SA	3
4.12	Thyroid uptake system and Gamma camera	1	4[6]	Lec	Sem	1
4.13	External Beam Therapy (Basic Idea): Telecobalt, Conformal Radiation Therapy	1	4[7]	GD	Ess	2
4.14	Contact Beam Therapy (Basic Idea): hypertherapy-LDR and HDR	1	4[7]	CL	SA	2
4.15	Radiotherapy - Medical linear accelerator.	1	4[7]	Lec	Sem	2
4.16	Basics of Teletherapy units	1	4[6]	GD	Ess	2
V RADIATION PHYSICS						
5.1	Principles of radiation protection	1	5[8]	Lec	Qui	2
5.2	protective materials-radiation effects	1	5[10]	Lec	SA	2
5.3	somatic, genetic stochastic and deterministic effect	1	5[8]	GD	Ess	2
5.4	Personal monitoring devices: TLD film badge	2	5[10]	CL	Ess	2
5.5	Pocket dosimeter, OSL dosimeter	1	5[10]	Lec	Sem	2
5.6	Radiation dosimeter.	1	5[8]	BS	MCQ	2
5.7	Natural radioactivity, Biological effects of radiation,	1	5[10]	Lec	SA	2
5.8	Radiation monitors	1	5[8]	Lec	SA	2
5.9	Steps to reduce radiation to Patient, Staff and Public.	1	5[10]	BS	MCQ	2
5.10	Dose Limits for Occupational workers and Public	1	5[10]	Lec	Ess	2
5.11	AERB: Existence and Purpose.	1	5[8]	CL	Sem	2

BOOKS FOR REFERENCE:

1. Medical Physics, J.R. Cameron and J.G.Skofronick, Wiley (1978)
2. Basic Radiological Physics Dr. K.Thayalan- Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)
3. Christensen"s Physics of Diagnostic Radiology: Curry, Dowdey and Murry - Lippincot Williams and Wilkins (1990)
4. Physics of the human body, Irving P. Herman, Springer (2007).
5. Physics of Radiation Therapy: F M Khan - Williams and Wilkins, 3rd edition (2003)
6. The essential physics of Medical Imaging: Bushberg, Seibert, Leidholdt and Boone Lippincot Williams and Wilkins, Second Edition (2002)
7. Handbook of Physics in Diagnostic Imaging: R.S.Livingstone: B.I. Publication Pvt Ltd.
8. The Physics of Radiology-H E Johns and Cunningham.

Course Title: Value Added Course IV
Environment and Sustainable Development

Course Type: **Theory**

Total Hours: 30 Hours/Week: 2 credits:1

Course Code: **23SE61**

Pass-Out Policy: Minimum Contact Hours: 18
Total Score %: 100 Internal: 40 External: 60
Minimum Pass %: 40 [No Minimum for Internal]

Course Creator

Expert 1

Expert II

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CLO- No.	Course Learning Outcomes <i>Upon completion of this course, students will be able to:</i>	% of PLO Mapping with CLO	CLO & PLO Mapped with GA#	Cognitive Level (CL)	Knowledge Category (KC)
CLO-1	understand the various environmental attributes	2(4), 3(4) 4(4), 5(3), 7(3), 8(2)	GA4	U	F
CLO-2	evaluate the impacts of over-exploitation and degradation of natural resources	7(8), 8(3), 4(5), 2(4)	GA 4	An	C
CLO-3	remember various global environmental issues	1(5), 2(5), 3(5), 0(5)	GA 8	E	P
CLO-4	create emphasis on energy conservation and need for sustainable development	7(6), 2(6), 3(8)	GA 9	Ap	M
CLO-5	create substantial goals for sustainable development	4(10), 5(5), 10(5)	GA 10	C	M

Module	Course Description	Hours	% CLO mapping Module	Learning Activities	Assessment Tasks	Ref.
1.1	Definition, scope and importance	1	1[25]	SI	ST	1
1.2	Multidisciplinary nature of environmental issues	1	1[25]	KW L	ST	1
1.3	Need for public awareness	1	2[25]	Sem	ST	1
1.4	Concept of sustainable development	1	5[25]	GD	ST	1
2.1	Renewable and non-renewable resources	1	1[25]	Lec	CT	1
2.2	Land resources, forest resources, water resources	1	1[25]	Lec	HoA	1
2.3	Mineral resources, energy resources, food resources	1	1[25]	Lec	HoA	1

2.4	Conservation of resources	1	1[25]	RP	HoA	1
3.1	Ecosystem: Concept, structure and tion	2	1[25]	BS	MCQ	2
3.2	Food chains, food webs and energy flow in cosystem	2	1[25]	Lec	MCQ	2
3.3	Biodiversity: Definition, values, levels of ogical diversity and mega-diversity ers	2	1[13] 2[12]	BS	OBT	2
3.4	Endangered and endemic species of India. Threats and conservation of biodiversity	2	2[25]	Sem	OBT	2
4.1	Environmental pollution: Air, water, soil noise pollution- causes, effects and rols	2	1[12] 2[13]	Sem	SA	3
4.2	Solid waste management, control sures of urban and industrial waste	2	4[25]	CS	Qui	3
4.3	Disaster management: Floods, earthquake, one and landslides	2	4[25]	CS	Qui	3
4.4	Environmental policies and practices	1	5[25]	Rep	HoA	3
5.1	Clean energy technologies	2	2[25]	GT	MCQ	3
5.2	Bio-energy and conversion systems	2	3[25]	FW	OT	3
5.3	Green building with eco-friendly materials	2	4[25]	MPr	OBT	3
5.4	Zero waste management	1	4[12] 5[13]	SP	HoA	3

BOOKS FOR REFERENCE:

1. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publication, India.
2. Barthwl, R. R. 2002. Environmental Impact Assessment, New Age International Publishers, New Delhi, India.
3. United Nations Environment Programme (UNEP). 1995. Global Biodiversity Assessment, Cambridge University Press.