

RAJAH SERFOJI GOVERNMENT COLLEGE(AUTONOMOUS)
(Reaccredited with 'A' Grade by NAAC)
(Affiliated to Bharathidasan University, Tiruchirappalli)
THANJAVUR – 613 005,
TAMIL NADU.



DEPARTMENT OF PHYSICS

DEPARTMENT OF PHYSICS



CURRICULUM AND SYLLABUS

Academic year 2022-2023 onwards.



RAJAH SERFOJI GOVT. COLLEGE(AUTONOMOUS)

Re accredited with 'A' Grade by NAAC

(Affiliated to Bharathidasan University, Tiruchirappalli)

Thanjavur – 613 005, Tamil Nadu, India

DEPARTMENT OF PHYSICS



BOARD OF STUDIES

IN PHYSICS

Date: 18.08.2022



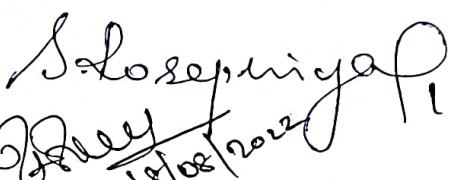
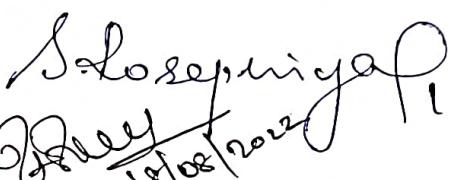
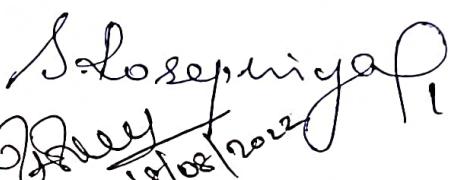
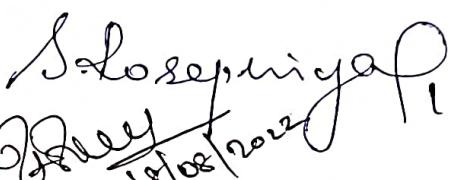
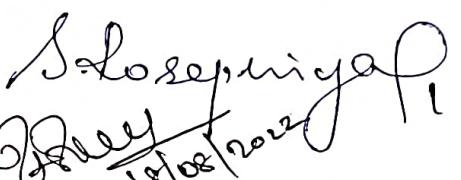
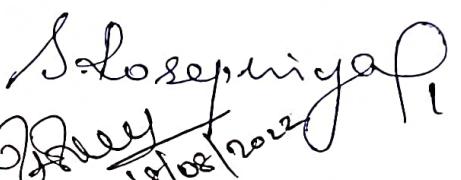
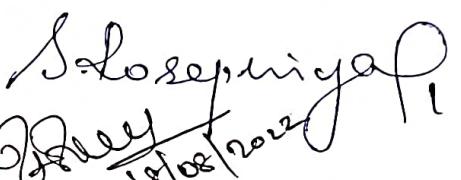
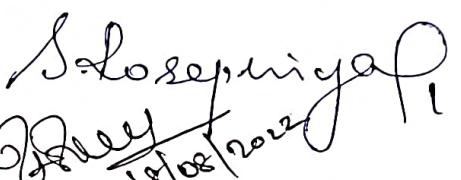
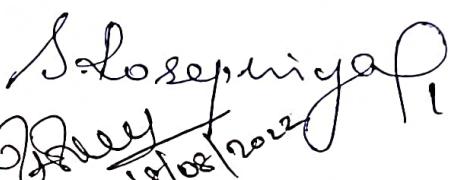
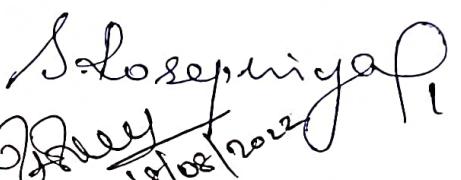
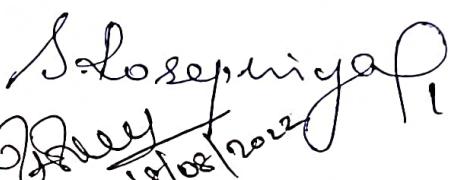
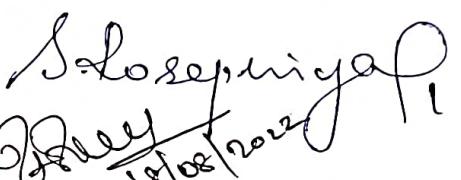
BOARD OF STUDIES MEETING – 18.08.2022

The Board of Studies (BOS) meeting in Physics was held on 18.08.2022 (Thursday) at 11.00 am in the Department of Physics under the chairmanship of Dr. A. Santhanam Head, Department of Physics. The following members were present in the meeting.

INTERNAL MEMBERS

1. Dr. G. Rani
2. Dr. S. Sakthivel
3. Dr. S. Rosepriya
4. Mrs. S. Senthilkumari
5. Dr. B. Shanmugapriya
6. Dr. S. Nilavazhagan.
7. Dr. C. Kumar
8. Dr. S. Veera Rethina Murugan
9. Dr. T. Ganesh
10. Dr. N. Chidambaram.
11. Dr. D. Anbuselvan
12. Dr. P. Jagdish
13. Dr. P. Paramasivam

SIGNATURE

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EXTERNAL MEMBERS:**SIGNATURE**

- c.
1. Dr. T. Sabari Girisun
(University Nominee)
 2. Dr. R. S. Sundararajan
(Subject Expert)
 3. Dr. S. Valanarasu
(Subject Expert)
 4. Mr. T. Manoharan
(Representative from Industry/
Corporate relating to placement)
 5. Dr. T. Arivudai Nambi
(PG Meritorious alumni)

Dr. AC DS 2022
16/08/22

R.S. - 18(8)SL

Mr. T. Manoharan
18/08/22

The syllabus for B.Sc., physics (Major and Allied), M.Sc., physics and M.Phil., physics under CBCS system was discussed, corrections/changes were made and finalized. The finalized syllabus was approved in the meeting held on 18.08.2022. This syllabus is for the candidates admitted from the academic year 2022-2023.

18-8-22
Dr. A. Santhanam

(Chairman, BOS-Physics)
HEAD,
DEPARTMENT OF PHYSICS,
RAJAH SERFOJI GOVT. COLLEGE,
THANJAVUR-613 005.

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RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS), THANJAVUR-613005

B.Sc PHYSICS COURSE STRUCTURE

(For candidates admitted from the academic year 2022 -2023)

Sem.	Part	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam. Hrs.	Marks		Total
								Int.	Ext.	
I	I	LT	A1T1	Tamil-I	6	3	3	25	75	100
	II	LE	A1E1	English for Communication-I	6	3	3	25	75	100
	III	CC1	A1PH1	Properties of Matter and Sound	6	5	3	25	75	100
	III	CC2	A1PHP1	Practical-I (Major Practical)	3	3	3	40	60	100
	III	Allied 1	A1AMA1	Allied Mathematics-I	4	4	3	25	75	100
	III	Allied 2	A2AMA2	Allied Mathematics-II	3	-	-	-	-	-
	IV	VE	A1VE	Value Education	2	2	3	25	75	100
					Total	30	20			600
II	I	LT	A2T2	Tamil-II	6	3	3	25	75	100
	II	LE	A2E2	English for Communication-II	6	3	3	25	75	100
	III	CC3	A2PH2	Mechanics & Relativity	6	5	3	25	75	100
	III	CC4	A2PHP2	Practical-II (Major Practical)	3	3	3	40	60	100
	III	Allied 2	A2AMA2	Allied Mathematics-II	3	4	3	25	75	100
	III	Allied 3	A2AMA3	Allied Mathematics-III	4	4	3	25	75	100
	IV	ES	A2ES	Environmental Studies	2	2	3	25	75	100
					Total	30	24			700
III	I	LT	A3T3	Tamil-III	6	3	3	25	75	100
	II	LE	A3E3	English for Communication-III	6	3	3	25	75	100
	III	CC5	A3PH3	Heat and Thermodynamics	4	4	3	25	75	100
	III	CC6	A3PHP3	Practical-III (Major Practical)	3	3	3	40	60	100
	III	Allied 4	A3ACH1	Allied Chemistry-I	4	3	3	25	75	100
	III	Allied 5	A4ACHP	Practical-I (Allied Chemistry)	3	-	-	-	-	-
	IV	SEC1	A3SB1	Domestic Appliances	2	2	3	25	75	100
					Total	30	20			700
IV	I	LT	A4T4	Tamil-IV	6	3	3	25	75	100
	II	LE	A4E4	English for Communication-IV	6	3	3	25	75	100
	III	CC7	A4PH4	Optics	4	3	3	25	75	100
	III	CC8	A4PHP4	Practical-IV (Major Practical)	3	3	3	40	60	100
	III	Allied 5	A4ACHP	Practical-II (Allied Practical)	3	4	3	40	60	100
	III	Allied 6	A4ACH2	Allied Chemistry-II	4	4	3	25	75	100
	IV	SEC2	A4SB2	House wiring	2	2	3	25	75	100
					Total	30	24			800

20.01.2023

HEAD,
DEPARTMENT OF PHYSICS,
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	III	CC9	A5PH5	Atomic & solid state physics	7	6	3	25	75	100
	III	CC10	A5PHP5	Practical-V (Major Practical)	7	6	3	40	60	100
V	III	DSE1	A5PHEL1A	Electricity and Magnetism	6	5	3	25	75	100
			A5PHEL1B	Nano Physics						
			A5PHEL1C	Ultrasonic and its Applications						
	III	DSE2	A5PHEL2A	Analog Electronics	6	5	3	25	75	100
			A5PHEL2B	Laser and its Applications						
			A5PHEL2C	Astronomy						
	IV	SSD	A5SSD	Soft Skill Development	2	2	3	25	75	100
	IV	SEC3	A5SB3	Physics for competitive exams	2	2	3	25	75	100
	IV	*ECC1		Energy Physics	-	4	3	-	100	100
	III			Internship (optional)	-	2	-	-	-	-
Total					30	26				600
VI	III	CC11	A6PH6	Wave Mechanics & Nuclear Physics	7	6	3	25	75	100
	III	CC12	A6PH7	Digital Electronics	7	6	3	25	75	100
	III	CC13	A6PHP6	Practical-VI (Major Practical)	7	5	3	40	60	100
	III	DSE3	A6PHEL3A	Microprocessor and programming in C	7	5	3	25	75	100
			A6PHEL3B	X - Ray Crystallography and Biophysics						
			A6PHEL3C	Principles of Communication systems						
	IV	GS	A6GS	Gender Studies	2	2	3	25	75	100
	IV	*ECC2		Crystal growth and Thin Film physics	-	4	3	-	100	100
	V	Activitie		NCC/NSS/SPORTS/RCC/YRC/CCC	-	2	-	-	-	-
Total					30	26				500
Grand Total						140				3900

As. n.:

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Part	Course	No of pap	Total Credits
I	Tamil	4x3	12
II	English	4x3	12
		6x4	24
	Core	7x5	35
	Allied	6x4	24
		1x5	5
	Elective	2x4	8
III	* Internship	1x2	2*
	VE,ES	2x2	4
	Skill based	3x2	6
	Generic elective	2x2	4
	SSD	1x2	2
IV	GS	1x2	2
V	Extra activities	1x2	2
	Total		140

*Not considered for CGPA

Separate Passing Minimum is prescribed for Internal and External

- a) The Passing Minimum for CIA shall be 40%
- b) The passing minimum for Autonomous Examinations shall be 40%

Head of the Department

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**CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR - 613 005.**

Semester: I
Course : CC1
Code : A1PH1

Credits: 5
Hours/Week: 6
Medium: English and Tamil

PROPERTIES OF MATTER AND SOUND

(For students admitted from 2022-23)

OBJECTIVES

- To Provide Fundamental Knowledge about Elasticity and Beams.
- To Study the Concept of Surface tension, Viscosity and Sound.

UNIT I: ELASTICITY

Hooke's law – Different Moduli of Elasticity – Poisson's ratio – Relation between elastic constants – Work done in stretching a wire – Twisting couple per unit twist – Experimental determination of rigidity modulus by static torsion method –Torsional pendulum - Period of oscillations of Torsional pendulum – Experimental determination moment of inertia of the disc by torsional oscillations.

UNIT: II BENDING OF BEAMS

Beam – Expression for the bending moment – Cantilever – Depression of the loaded end of the cantilever - Experimental determination of Young's modulus by Cantilever depression –Non-uniform bending – Expression for Depression - Experiment to determine Young's modulus using pin and microscope –Uniform bending - Expression for Elevation – Experiment to determine Young's modulus mirror and telescope – Koenig's method- I shape girder.

UNIT III: SURFACE TENSION

Cohesive and Adhesive forces – Explanation of surface tension on Kinetic theory – Angle of contact – Excess pressure inside a curved liquid surface (Synclastic), Liquid drop and Soap bubble –Experimental determination of surface tension of liquid and Liquid interface by drop weight method - Experimental determination of surface tension of the liquid at different temperatures by Jaeger's method – Variation of surface tension with temperature.

UNIT IV: VISCOSITY

Streamline and turbulent motion – critical velocity – Rate of flow of liquid in a capillary tube – Poiseuille's formula – Experiment to determine coefficient of viscosity of liquid (variable pressure head) – Searle's viscometer-Rotating cylinder method of finding coefficient of viscosity of viscous liquid - viscosity of gases – Meyer's formula - Effect of temperature and pressure on viscosity of liquids- Applications.

UNIT V: SOUND

Laws of transverse vibrations of strings – Sonometer – verification of laws – Determination of AC frequency – Determination of frequency using Melde's apparatus - Musical sound and noise – Characteristics of musical sound – Factors affecting the acoustics

of building – Requisites of good acoustics-Ultrasonic waves – Properties-Production by piezoelectric oscillator method –Applications of ultrasonic waves-.

OUTCOMES

By the end of the course the students will know about

- The concepts of elastic nature of a material.
- The bending of beams and its importance.
- The surface tension and its applications.
- The basic concepts of viscosity and its implications.
- Sound, musical and acoustical importance of waves.

BOOKS FOR STUDY

1. Properties of Matter and Acoustics, Murugeshan, Kiruthiga Sivaprasath , S. Chand Co Ltd (2011).
2. Properties of Matter – Brijlal and Subramaniam, S. Chand Co., Ltd(2001).
3. A Text Book of Sound, Brijlal and Subramanyam.N, 2nd Revised Edition, Vikas Publishing House Pvt. Ltd (2014).
4. Properties of matter –A.Sundravelusamy (1995).

BOOKS FOR REFERENCE

1. Elements of Properties of Matter, Mathur.D.S, S. Chand, Ltd (1968).
2. Properties of Matter, Subramanian Iyer and Jeyaraman (1988).
3. H.C. Oscillations, Waves and Sound, Sharma.L.P, Saxena (1986)

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)


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THANJAVUR - 613 005.

Semester: 1
Course : CC2
Code : A1PHP1

Credits: 3
Hours/Week: 3
Medium: English and Tamil

OBJECTIVES

MAJOR PRACTICAL – I

(For students admitted from 2022-23)

- To develop observation and computation skills.
- To develop skills in handling instruments.
- To get practical knowledge on various general and electricity experiments in physics.

(Minimum Ten experiments)

1. Young's modulus – Non uniform bending – Pin and microscope
2. Young's modulus - Non uniform bending – Scale and telescope.
3. Surface tension and Interfacial surface tension by drop weight method.
4. Coefficient of viscosity of liquid- Poiseuille's flow method.
5. Compound Pendulum – Determination of g and K.
6. Sonometer – Determination of frequency of a given tuning fork.
7. Sonometer- Determination of relative density of a solid and liquid.
8. Newton's law of cooling – Specific heat capacity of a given liquid.
9. Spectrometer – Refractive index of the prism.
10. Newton's rings-Determination of radius of curvature of a convex lens.
11. Characteristics of Junction diode.
12. Characteristics of Zener diode.
13. Meter bridge – Determination of resistance of a coil.
14. Potentiometer – Calibration of low range voltmeter.
15. Logic gates (AND, OR and NOT) – Using discrete components.

OUTCOMES

- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Understand the validity of basic laws and theories to determine various properties of materials.

Maximum Marks-60

Exam Duration: 3 Hours



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Semester: 2
Course : CC3
Code : A2PH2

Credits: 5
Hours/ Week: 6
Medium: English and Tamil

MECHANICS AND RELATIVITY

(For students admitted from 2022-23)

OBJECTIVES

- To acquire knowledge about projectiles.
- To understand the concept of dynamics and rigid bodies.
- To study and apply the knowledge of gravitation at various situations It elucidates the concept of pressure, centre of gravity and relativity.

UNIT I: PROJECTILE, IMPULSE & IMPACT

Projectile- Path of a projectile is a parabola – Range on an inclined plane – Impulse – Impact – Laws of impact – Impulse of a force - Laws of impact - Direct impact between two smooth spheres - oblique impact between two smooth spheres - Loss of kinetic energy.

UNIT II: DYNAMICS OF RIGID BODIES

Kinetic energy of rotation – Angular momentum of a rotating body – Compound pendulum – equivalent simple pendulum – centre of suspension & centre of oscillation – centre of percussion – minimum period – Determination of g and radius of gyration of a bar pendulum.

Law of conservation of momentum – Center of mass - System of variable mass- Equation of Rocket motion – conservation of linear and angular momentum.

UNIT III: GRAVITATION

Newton's law of gravitation – Determination of G Boy's method – Intensity of gravitational field – Kepler's law of Gravitation - Equipotential surface – Acceleration due to gravity (g) - Variation of ' g ' with Altitude, Depth and Latitude.

Seismology: Earth quakes – seismic waves – Determination of epicenter and focus – Modern applications of seismology.

UNIT IV: CENTER OF PRESSURE AND CENTRE OF GRAVITY

Centre of pressure of a rectangular lamina with vortex on surface, base on the surface - effect of centre of pressure on further immersion – Meta centre - Experimental determination of metacentric height of a ship - Variation of atmospheric pressure with altitude – height of the homogenous atmosphere.

Centre of gravity - Centre of gravity of solid hemisphere, solid cone and tetrahedron.

UNIT V: SPECIAL THEORY OF RELATIVITY

Frame of Reference - Galilean transformation – Michelson Morley Experiment- Postulate of special theory of relativity- Lorentz transformation equations- Result from

Lorentz transform equations- Length contraction, Time dilation, Relativity of simultaneity, Addition of velocities.

Variation of mass with velocity – Mass energy equivalence with examples- Relationship between total energy, rest mass and momentum- Zero rest mass.

OUTCOMES

By the end of the course, the student will be able to

- Understand the fundamentals of impulse, impact of bodies.
- Understand the fundamental concepts of dynamics of body and understanding the conservation of momentum.
- Learn about gravitation, centre of pressure and gravity.
- Understand the concepts of relativity and its significance.

BOOKS FOR STUDY

1. Mechanics - M. Narayananamoorthy and N. Nagarethnam – NPC- Chennai.
2. Modern Physics: R. Murugesan, Kiruthiga Sivaprasath S. Chand & Co Ltd New Delhi
3. Hydrostatics – M.Narayananamoorthy and N.Nagarethnam.
4. An Introduction to mechanics- Kleppher and Kolenkow, McGraw Hill Education, 2017.

BOOKS FOR REFERENCE

1. Mechanics for B.Sc., Classes P. R. Subramaniam, T. Jayaraman and C. Rangarajan S.V. Publishers Chennai.
2. Mechanics D.S. Mathur S. Chand & Co Ltd New Delhi.(2000)

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

DB ·
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THANJAVUR - 613 005.

Semester: 2
Course : CC4
Code : A2PHP2

Credits : 3
Medium: English and Tamil
Hours/Week : 3

MAJOR PRACTICAL-II

(For students admitted from 2022-23)

OBJECTIVES

- To develop observation and computation skills.
- To develop skills in handling instruments.
- To get practical knowledge on various general and electronic experiments

(Minimum Ten experiments)

1. Young's modulus – Uniform bending – Pin and microscope.
2. Young's modulus – Uniform bending – Scale and Telescope.
3. Surface tension by capillary rise method.
4. Comparison of viscosities of the given two liquids.
5. Sonometer –Verification of laws of vibrations of a stretched string.
6. Sonometer- Determination of AC frequency.
7. Melde's string -Determination of frequency of a given tuning fork - Longitudinal and Transverse modes.
8. Lee's disc – Thermal conductivity of a bad conductor.
9. Spectrometer – Hollow prism- μ of a given liquid.
10. Air Wedge- Determination of thickness of a thin wire.
11. Meter bridge – Verification of laws of resistance.
12. Potentiometer –Ammeter Calibration.
13. Half wave rectifier.
14. Logic gates (AND, OR, NOT, NAND, NOR, EXOR) – Using ICs.

OUTCOMES

- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Apply the knowledge of the fundamentals of physics in electricity, electronics and sound through experiments.

Maximum Marks-60

Exam Duration: 3 Hours


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Semester: 3
Course : CC5
Code : A3PH3

Credits: 4
Hours/Week: 4
Medium: English and Tamil

HEAT AND THERMODYNAMICS

(For students admitted from 2022-23)

OBJECTIVES

- To enable the students to understand the nature and transmission of heat and various associated laws.
- To study the laws of Thermodynamics and its applications.
- To understand various types of statistical thermodynamics.

UNIT I: TRANSMISSION OF HEAT

Modes of heat transfer - Coefficient of thermal conductivity – Newton's law of cooling – Determination of specific heat capacity of liquid – Lee's Disc method for the determination of thermal conductivity of bad conductors – Black body radiation – Wein's law – Raleigh Jean's law - Planck's law of Black body radiation - Stefan's law – Mathematical derivation – Newton's law of cooling from Stefan's law –Experimental verification – Stefan's constant – Experimental determination.

UNIT II: SPECIFIC HEAT

Specific heat – Principle of calorimeter - Specific heat of gas – Types – Mayer's relation - Specific heat of a gas at C_v by Joly's steam calorimeter – C_p by Regnault's method – Specific heat of liquid by Joule's calorimeter – Specific heat of solids – method of mixtures - Dulong and Petit's Law – Variation of specific heat and atomic heat with temperature.

UNIT III: LOW TEMPERATURE PHYSICS

Joule Kelvin effect – Inversion temperature –Liquefaction of air by Linde's process – liquefaction of Helium by K. Onnes method – properties of Helium I and Helium II – Production of low temperature - Adiabatic demagnetisation – practical applications of low temperature – Refrigerator and air conditioner (basic concepts only).

UNIT IV: THERMODYNAMICS

Zeroth, first and second laws of thermodynamics – reversible and irreversible processes – Isothermal and Adiabatic processes – work done – Carnot's engine – efficiency – thermodynamical scale of temperature - Clapeyron Latent heat equation – Entropy – Change of Entropy in a Reversible and Irreversible Process – 3rd Law of thermodynamics – T-S Diagram – Entropy of a perfect gas – Derivation of Maxwell's thermodynamical relations.

UNIT V: STATISTICAL THERMODYNAMICS

Statistical equilibrium – Maxwell-Boltzmann distribution law – Maxwell-Boltzmann distribution law in terms of temperature – application to ideal gas – Fermi-Dirac distribution Law – Electron gas – Fermi energy – Bose – Einstein distribution Law – Photon gas – Comparison of three statistics.

OUTCOMES

By the end of the course the students will know about

- Learn experimental methods to determine the transmission of heat.
- Understand the laws of thermodynamics and their applications.
- Understand the concepts of statistical thermodynamics.

BOOKS FOR STUDY

1. Heat and Thermodynamics - Brijlal and Subramanian. S.Chand Publishers, 1998.
2. Heat and Thermodynamics - J.B.Rajam. S.Chand Publishers, 1987.
3. Concepts in Thermal Physics- S.J Blundell and K.M. Blundell, Oxford university press, 2012.
4. Heat – M. Narayananurthi and N. Nagaratnam.

BOOKS FOR REFERENCE

1. Thermal physics – R. Murugesan and kiruthiga siva prasath, S. Chand & Co, New Delhi – 2008.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)


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Semester: 3
Course : CC6
Code : A3PHP3

Credits : 3
Hours/Week : 3
Medium : English and Tamil

MAJOR PRACTICAL-III

(For students admitted from 2022-23)

OBJECTIVES

- To develop observation and computation skills.
- To develop skills in handling instruments.
- To get practical knowledge on various general and electronics experiments

(Minimum Ten experiments)

1. Young's Modulus- Cantilever (Scale and Telescope).
2. Young's Modulus –Cantilever (Pin and Microscope).
3. Rigidity Modulus – Static Torsion.
4. Specific heat capacity of a given liquid-Joule's calorimeter.
5. Specific heat capacity of a given solid –Method of mixtures.
6. Spectrometer- Grating- Normal Incidence method.
7. Carey Foster Bridge- Specific resistance of a coil.
8. Potentiometer – Resistance of a coil.
9. Tan A and Tan B position- Magnetic moments of a given magnet.
10. Figure of merit- Table Galvanometer.
11. Transistor characteristics – CB Configuration.
12. Voltage Doubler and Tripler.
13. Zener regulated power supply- % of regulation.
14. Verification of De Morgan's Theorems.

OUTCOMES

- Validate the fundamentals of physics.
- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Apply the knowledge of the fundamentals of physics in electronics and electricity through experiments.

Maximum Marks-60

Exam Duration: 3 Hours

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THANJAVUR - 613 005.

Semester: 3
Course : SEC1
Code : A3SB1

Credits: 2
Hours/Week: 2
Medium: English and Tamil

DOMESTIC APPLIANCES

(For students admitted from 2022-23)

OBJECTIVES

- To get knowledge of how domestic electric devices work
- To understand and acquire skills on the working of heating and lighting appliances.

UNIT I: FUNDAMENTALS OF ELECTRICITY

Electricity – Charge-Electric current –Direction of flow of current –Resistance – series and parallel -Ohms law-Kirchhoff's law.

UNIT II: ELECTRIC COMPONENTS AND MEASURING INSTRUMENTS

Conductor - Insulator - Resistor -Capacitor - Galvanometer -Ammeter - Voltmeter - Ohm meter-AVOmeter(multimeter) -Watt - Watt hour meter - Commercial electrical billing(problem)-Line tester.

UNIT III: HEATING AND LIGHTING APPLIANCES

Electric iron box-Electric hotplate - Room Heater - Immersion heater-Geyser-CFL, LED lamps.

UNIT IV: MODERN ELECTRICAL APPLIANCES

Design and working of basic Water motors - Fan - Refrigerator - Air Conditioning –Wet grinder - Microwave oven - Hair drier- vacuum cleaner.

UNIT V: STAND BY DEVICES AND SAFETY MEASURES

Switch - Fuse – Standard Wire Gauge - Miniature circuit breaker (MCB) - Earthing – Uninterrupted Power Supply - Inverter.

Electric shock and its effects -Symptoms and first aid - Safety tips - Home repair safety tips - Tips for conserving electricity.

OUTCOMES

By the end of the course the students will be able to

- Know the fundamentals of Electricity.
- Get the idea of how domestic electric devices work.
- Understand the working of Standby Devices.
- Know the methods to conserve Electricity.

BOOKS FOR STUDY

1. Basic Electrical Engineering - M.L.Anwani & I.Anwani Dhanpat Rai and Co.
New Delhi , 2012 .
2. Domestic Electric Appliances - General Interest book from market shelf.
3. Electrical Appliances –Complete Guide to the maintenance and repair of Domestic Electrical Appliances- Graham Dixon.
4. Domestic Electrical Appliances-Thomas Anthony Buchanan Corley-Cape, 1996
5. Domestic Electrical Appliances (Motor type)-Ministry of Commerce & Industry-Govt. of India.

REFERENCES

1. <http://www.howstuffworks.com>.
2. <http://www.answers.com>
3. <http://www.wikipedia.org>

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $5 \times 6 = 30$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-B $3 \times 15 = 45$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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Semester: 4
Course : CC7
Code : A4PH4

Credit: 3
Hours/Week: 4
Medium: English and Tamil

OPTICS

(For students admitted from 2022-23)

OBJECTIVE

- To understand the various properties of light when it interact with media

UNIT I: GEOMETRICAL OPTICS

Wave optics: Nature of light - Theories of light - Electromagnetic nature of light. Definition of a wave front - propagation of a wave front - Huygens principle of secondary wavelets.

Defects of image: Monochromatic aberration and Chromatic aberration-Spherical aberration in a lens -Methods of minimizing the spherical aberration - Chromatic aberration in a lens - Condition for achromatism for two thin lenses in contact, separated by a distance.

UNIT II: INTERFERENCE

Principle of superposition-Coherence-Temporal coherence and Spatial coherence-Condition for interference of light- Dark and bright fringes – Double slit interference (Theory of interference fringes and bandwidth)-Interference in thin films - Wedge shaped films-determination of diameter of thin wire by Air wedge - Newton's rings (reflected system)-Determination of wave length – Refractive index of a liquid.

UNIT III: DIFFRACTION

Fresnel diffraction: Half period zones - Explanation of rectilinear propagation of light - Diffraction at a circular aperture - diffraction at a straight edge - Zone plate.

Fraunhofer diffraction: Construction of half period zones - Zone plate - Construction, theory -Comparison of zone plate and convex lens - Fraunhofer diffraction at a single slit, double slit – theory of Plane transmission grating – determination of wavelength (normal incidence method) –Dispersive power of a grating.

UNIT IV: POLARISATION

Plane polarized light - Polarization by reflection - Brewster's law - Pile of plates – Double refraction –Huygens explanation for double refraction in Uni axial crystals - Nicol Prism – Nicol prism as a polarizer and analyzer - Quarter wave plate and half wave plate - Specific rotation – Laurentz half shade polarimeter.

UNIT V: LASERS AND FIBRE OPTIC COMMUNICATIONS

Introduction to Laser –Characteristics- Basic components of a laser-Metastable states – Population Inversion and lasing action – Optical pumping – Spontaneous and Stimulated emission – Nd:YAG laser, He-Ne Laser –General Applications.

Optical Fibre – Types – Numerical aperture – Fibre optics communication system – Advantages.

OUTCOMES

By the end of the course students will be able to,

- Understand geometrical optics
- Get idea of diffraction and interference
- Grasp the basics of polarization
- Understand the concept of LASER and Fibre optics.

BOOKS FOR STUDY

1. Optics and Spectroscopy - R.Murugesan, 2010.
2. A Text book of Optics - N.Subramanian, Brijlal and M.N. Avadhanulu, S.Chand and Co.2006.
3. Laser and Non – Linear Optics – B.B. Laud, New Age International Private Limited Publishers,
4. An Introduction to LASERS Theory and Applications – M. N. Avadhanulu, S.Chand and Co.2004.
5. Allied Physics – A.Sundaravelusamy, Priya publications, 1996.

BOOKS FOR REFERENCE

1. Engineering physics – G.Vijayakumari, Vikas Publications 2013.
2. A Text Book of Optics – Brijlal and Subrahmanyam, S.Chand and Co. 2004.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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Semester : 4
Course : CC8
Code : A4PHP4

Credits : 3
Hours/Week: 3
Medium: English and Tamil

MAJOR PRACTICAL – IV

(For students admitted from 2022-2023)

OBJECTIVES

- To develop observation and computation skills.
- To develop skills in handling instruments.
- To get practical knowledge on various general and electronics experiments

(Minimum Ten experiments)

1. Torsional pendulum – Determination of Rigidity modulus (Without symmetrical masses)
2. Torsional pendulum – Determination of Rigidity modulus (With symmetrical masses)
3. Stokes method – Determination of the viscosity of a given liquid.
4. Spectrometer –Grating –Minimum Deviation –Wavelength determination.
5. Spectrometer- (i-d) curve.
6. Potentiometer- Temperature co-efficient of a given coil.
7. Tan C – Determination of M and H.
8. Field along the axis of a coil- H determination.
9. Field along the axis of a coil - Determination of Magnetic moment.
10. Transistor characteristics – CE Configuration.
11. LCR –Series resonance circuit- Self inductance and quality factor of a coil.
12. LCR –Parallel resonance circuit- Self inductance and quality factor of a coil.
13. Associative law and Distributive law- Verification.
14. Study of waveforms using C.R.O.

OUTCOMES

- Validate the fundamentals of physics.
- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Understand the application of various experiments in our day to day life.
- Apply the knowledge of the fundamentals of physics and instrumentation to arrive at solution for various problems.

Maximum Marks-60

Exam Duration: 3 Hours

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Semester: 4
Course : SEC2
Code : A4SB2

Credits: 2
Hours/Week: 2
Medium: English and Tamil

HOUSE WIRING

OBJECTIVE

- To understand the fundamental concepts of house wiring

UNIT I: WIRES

Wires – Stranded wires – Types of wires – Lead sheathed wire – TRS (or) CTS wires- Weather proof wires – Flexible wires – Wire splicing and termination –Western union splice (or) twist splice.

UNIT II: SWITCHES

Symbols of electrical and connecting accessories – Switches – Surface switch (or) Tumbler switch – Pull switch (or) Ceiling switch – Grid switch – Architrave switch – Main switch – Splitter units – Distribution fuse boards – Circuit breaker.

UNIT III: FUSE AND LAMP HOLDERS

Fuse – Principle of operation – Melting points of various metals – Silver as a fusing element – Copper as a fuse wire.
Lamp holder – Switched bayonet cap lamp holders – Swivel lamp holders – Ceiling rose – Plugs.

UNIT IV: WIRING AND EARTHING

General rules related to wiring - Wiring tools – materials – procedure –safety and precaution- layout diagram – one lamp from one switch- Single phase and three phase wiring.
Earthing – Neutral wire – Requirement for grounding – Methods of Earthing – Earthing through water main pipe – plate Earthing.

UNIT V: TESTING

Testing procedures – Insulation and leakage test – continuity test – open circuit test – short circuit test – polarity test – Earthing system test.

OUTCOME

By the end of the course, the student will be able to

- Acquire basic skills on House wiring.

BOOKS FOR STUDY

1. Electrical wiring, Estimating and Costing – S.L.Uppal, Khanna Publications, Delhi, 2006.

BOOKS FOR REFERENCE

1. House wiring – Ramanathan Publications, 2014.
2. Electrical wiring residential – Ray.C.Mullin.Phil Simmons, Delmar, Cengage learning, 2012.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $5 \times 6 = 30$ Marks Answer All Questions (Either or Type- Two Questions from each unit)

Part-B $3 \times 15 = 45$ Marks (Three out of Five-one question from each unit)


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Semester: 5
Course : CC9
Code : A5PH5

Credits: 6
Hours/Week: 7
Medium: English and Tamil

ATOMIC AND SOLID STATE PHYSICS

(For students admitted from 2022-23)

OBJECTIVES

- To study the atomic structures and emission procedures of X-Rays from atoms and their utilizations.
- To understand crystal structure and superconductivity.

UNIT I: ATOMIC STRUCTURE

Excitation of atoms – Critical potential – Excitation potential – Ionization potential – Experimental determination of critical potential – Frank and Hertz's method – Vector atom model - Quantum numbers associated with Vector atom model- Coupling schemes – L-S and J - J coupling - Pauli's exclusion principle and verification .

UNIT II: FINE STRUCTURE OF SPECTRAL LINES

Magnetic dipole moments due to orbital and spin motion of the electron – Selection rule for electron transition – Intensity rules – Interval rule – Fine structure of sodium D line – Zeeman effect – Normal and Anomalous (Experimental study and results) – Debye's theory of normal Zeeman effect– Lorentz theory of anomalous Zeeman effect - Paschen Back effect and Stark Effect.

UNIT III: X-RAYS

Origin of X-Rays – Properties- Production of x-rays-Absorption of X-Rays – Continuous, Characteristic X-Rays–Mosley's Law –its importance-Bragg's law –Bragg X-ray spectrometer –Powder crystal method - Compton effect– Theory and experimental verification.

UNIT IV: PHOTO ELECTRICITY

Photo electric effect – laws of photoelectric emission -Einstein's photo electric equation–Millikan's experiment–verification of Einstein's equations –determination of Plank's constant.

Photo electric cells - Photo emissive cells, Photo voltaic, Photo conductive cells – Applications of photo electric cells.

UNIT V: SOLID STATE PHYSICS

Crystalline and Amorphous solids - space Lattice – basis and unit cell – Lattice parameters – seven classes of crystal system - Bravais lattice.

Number of atoms per unit cell, Atomic radius, Coordination number and packing fraction for simple cubic, Face centered cubic and Body centered cubic structures – Sodium chloride and Diamond structures.

Superconductivity – Type I and Type II superconductors – applications.

OUTCOMES

By the end of the course, the student will be able to

- Summarize atomic structure and understand fine structure of spectral lines.
- Understand the concept of X-rays and experimental techniques.
- Know the crystal structure and basics of superconductivity.

BOOKS FOR STUDY

1. Modern Physics - R.Murugesan, Kiruthiga Sivaprasath, S.Chand and company Ltd. New Delhi, 2012.
2. Modern Physics - Sehgal Chopra Sehgal S.Chand and company Ltd.
3. Modern Physics - J.B. Rajam, Kedarnath publications, 1967.
4. Solid state physics - Gupta Kumar, Vikas Publishing Pvt., Ltd., 2001.
5. Solid State Physics – R- L Singhal, Wiley Eastern Ltd., 1985.

BOOKS FOR REFERENCE

1. Modern Physics - B.L. Theraja, S.Chand and company Ltd, 2008.
2. Concepts of Modern Physics – Arthur Beiser, Tata McGraw – Hill publishing Company Limited, New Delhi, 2002.
3. Solid state physics - Saxena Gupta Saxena, Pragati Prakashan, 1985.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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Semester: 5
Course: CC10
Code: A5PHP5

Credits: 6
Hours/Week: 7
Medium: English and Tamil

MAJOR PRACTICAL – V

(For students admitted from 2022-2023)

OBJECTIVES

- To develop observation and computation skills.
- To develop skills in handling instruments.
- To get practical knowledge on various general and electronics experiments

(Minimum fourteen experiments)

1. Young's Modulus - Koenig's method-(Non-Uniform Bending).
2. Spectrometer – (i- i') curve.
3. Spectrometer – Cauchy's Constants A &B.
4. B.G – Figure of Merit – Voltage and Current Sensitiveness.
5. B.G- Absolute Capacitance.
6. Carey Foster's Bridge –Temperature co-efficient of resistance of a coil.
7. Potentiometer- Calibration of high range voltmeter.
8. Post office box – Temperature coefficient of resistance of a coil.
9. Transistor –Single Stage Amplifier.
10. Hartley Oscillator – Frequency and Self-inductance (L).
11. FET- Characteristics.
12. Regulated power supply using Zener diode – percentage of regulation.
13. Operational Amplifier – Adder and Subtractor.
14. NAND universal gate – Verification.
15. NOR as universal gate- verification.
16. Verification of De Morgan's Theorem.
17. Half Adder, Full Adder using basic logic gates-IC.
18. Multiplexer (4-1) and Demultiplexer (1-4).
19. Microprocessor – 8 bit addition and subtraction.
20. Microprocessor – Smallest and largest number in an array of data.

OUTCOMES

- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Understand the validity of basic laws and theories to determine various properties of materials.

Maximum Marks-60

Exam Duration: 3 Hours

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ELECTRICITY AND MAGNETISM

(For students admitted from 2022-2023)

OBJECTIVES

- To know about the static and dynamic electric fields and their applications.
- To know the fundamental concepts of electromagnetic induction.
- To understand magnetic properties of materials.

UNIT I: ELECTROSTATICS

Coulomb's law – Gauss's Law – Application – Electric field intensity at a point due to a charged solid sphere and cylinder - electric potential – relation between electric field and electric potential – Principle of capacitor – capacity of a spherical and cylindrical capacitors – energy stored in a capacitor – loss of energy due to sharing of charges.

UNIT II: CURRENT ELECTRICITY

Kirchhoff's Laws of Electricity – Wheat stone's bridge- Metre bridge - Carey Foster's Bridge – Measurement of resistance and Temperature coefficient of resistance of a coil, Potentiometer- Determination of internal resistance of a cell – Calibration of ammeter, low range and high range voltmeter.

Seebeck effect, Peltier effect, Thomson effect – Thermodynamics of thermocouple - Determination of Thomson, Peltier coefficients.

UNIT III: ELECTROMAGNETIC INDUCTION

Laws of Electromagnetic Induction – Self and Mutual induction - Self-Inductance by Raleigh's Method - experimental determination of mutual inductance – coefficient of coupling – Charge and Discharge of a Capacitor through a resistor – Measurement of high resistance by leakage.

UNIT IV: ALTERNATING CURRENT

Mean and RMS value of AC current - LC, LR, CR - AC Circuits - Series and Parallel resonance circuit – Resonance condition – Q factor – Wattless current - choke coil – Transformer – theory with and without load – uses - skin effect.

UNIT V: MAGNETIC PROPERTIES OF MATERIALS

Magnetic field – intensity of magnetisation - Permeability, Susceptibility (Definition only) - Relation between them – Properties of dia, para and ferro magnetic materials – Langevin's theory of dia and Para magnetism –B-H curve-Energy loss due to hysteresis – Importance of hysteresis curves.

OUTCOMES

By the end of course, the students will be able to

- Know about the fundamental laws of electricity and electromagnetism.
- Understand the magnetic properties of materials.

BOOKS FOR STUDY

1. Electricity and Magnetism - R. Murugesan, S. Chand & Company Ltd.
New Delhi, 2008.
2. Electricity and Magnetism - Brijlal and N. Subramanian, Ratan, Prakashan Mandir
Agra, 2000.

BOOKS FOR REFERENCE

1. Electricity and Magnetism D.L. Sehgal, K.L. Chopra and N.K. Sehgal.
5th Edition, S. Chand & Sons, New Delhi, 1996.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)


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Semester: 5
Course: DSE1
Code : A5PHEL1B

Credits: 5
Hours/Week: 6
Medium: English and Tamil

NANO PHYSICS

(For students admitted from 2022-2023)

OBJECTIVE

- To know the salient features of nano structures and nano materials.

Unit I: CRYSTAL STRUCTURE, SEMICONDUCTORS & THEIR PROPERTIES

Crystal structures – Crystal planes and directions- Miller Indices – Diffraction of X-rays by crystal - Bragg's equation – Correction to Bragg's equation – Reciprocal lattice – Crystal Defects – point, line and surface defects - Band model of semiconductors – carrier concentrations in intrinsic and extrinsic semiconductors – Fermi level – variation of conductivity and mobility with temperature – law of mass action. Hall Effect – Hall coefficients for intrinsic and extrinsic semiconductors – determination of Hall constant – Hall Effect devices.

Unit II: QUANTUM THEORY OF NANOMATERIALS

Development of Quantum theory of Nano materials: Application of Bloch functions in Nano materials. Quantum Dots: (a) Semiconductor Quantum Dots, (b) Introduction to lasers (c) Quantum Dot lasers (d) Quantum Cascade lasers and € Quantum Dot optical memory.

Unit III: PHYSICAL PROPERTIES AND FERROELECTRIC & PIEZOELECTRIC MATERIAL

Static dielectric constant, electronic, ionic and orientation polarizations – Internal or local fields in solid and liquids - Lorentz field in cubic materials – Clausius-Mossotti equation – complex dielectric constant – determination of dipole moment for polar substances – dielectric losses – frequency dependence of electronic, ionic, orientation polarizabilities – optical absorption, luminescence – Thallium activated alkali halides – electro luminescence.

Unit IV: SIZE DEPENDENT PROPERTIES OF NANOMATERIALS

Elucidation of the structure: chemistry and properties of Nano-structured materials - Variation in properties of micro and Nano materials - Length scale involved and effect on properties: mechanical, electronic, optical, magnetic and thermal properties.

Unit V: TYPES OF NANOSTRUCTURES AND NANOMATERIALS AND PROPERTIES

Definition of a Nano system – Types of Nano crystals-One Dimensional (1D)-Two Dimensional (2D) -Three Dimensional (3D) nano structured materials – Quantum dots – Quantum wire Core/Shell structures - Carbon Nano tubes (CNT) – Metals (Au, Ag) – Metal

oxides (TiO₂, CeO₂, ZnO) – Semiconductors (Si, Ge, CdS, ZnSe) – Ceramics and Composites – Dilute magnetic semiconductor- Biological system – DNA and RNA – Lipids – Size dependent properties – Mechanical, Physical and Chemical properties.

OUTCOME

By the end of the course, the students will be able to,

- Know the salient features of nano structures and nano materials

BOOKS FOR STUDY

1. Nano: The Essentials, T. Pradeep, Tata Mc Graw Hill education Pvt. Ltd, 2013
2. Nanotechnology Fundamentals and Applications, Manasi Karkare, I.K. International, 2011.
3. Introduction to Nanotechnology, K. Ravi chandran, K. Swaminathan, P.K. Preetha, P. Kavitha, JAZYM Publications, 2019.
4. Nanotechnology: Technology revolution of 21st century, S. Chand and Publications, 2009

BOOKS FOR REFERENCE

1. Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nano science, - Edward L. Wolf - Wiley-VCH, 2006.
2. Nano systems - K.E.Drexler, Wiley, 1992.
3. Nano structures and Nano materials: Synthesis, properties and applications - G.Cao - Imperial College Press, 2004.
4. Nanotechnology: An Introduction, Jeremy Ramsden, Elsevier, 2011
5. Nanotechnology, Richard Booker and Earl Boysen, Wiley India Pvt. Ltd. 2011

Question Paper Pattern

Maximum Marks -75

Exam Duration: 3 Hours

Part – A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer ALL Questions (Three out of Five- One question from each unit)


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Semester: 5
Course: DSE1
Code : A5PHEL1C

Credits: 5
Hours/Week: 6
Medium: English and Tamil

ULTRASONICS AND ITS APPLICATIONS

(For students admitted from 2022-2023)

OBJECTIVE

- To study about the production and applications of high frequency sound waves in engineering, medical, industrial and research fields

UNIT I: SOURCE OF ULTRASONIC WAVES

Piezo electric - magnetostrictive transducers, electromechanical coupling factors and transducer efficiency - Transducers and band width characteristics - Equivalent electrical circuit of piezoelectric vibrators. Detection of ultrasonic waves: - Mechanical, thermal, electrical and optical methods.

UNIT II: TECHNIQUES USED IN ULTRASONIC INVESTIGATIONS

Interferometer, Optical, pulse, sing-around, radiation pressure and streaming methods – Measurement of propagation constants in different media – Relative merits of the techniques – Diffraction effects of sound velocity and absorption measurements – Hypersonic velocity and absorption measurements.

UNIT III: PROPAGATION OF ULTRASONIC WAVES IN LIQUIDS

Propagation of ultrasonic waves in liquids: mixtures. Excess compressibility and the relation to excess volume – Excess intermolecular free length – relative association. Sound velocity and compressibility of electrolytic solutions – Dispersion of sound in liquids – Different mechanisms of the absorption of sound – Relaxation phenomenon.

UNIT IV: DIELECTRIC MEASUREMENTS

Continuous wave and pulse techniques for measuring elastic constants of solids - Determination of elastic constants of cubic crystals – Dielectric behaviour of materials – Dipole moment of polar and non – polar molecules – dielectric relaxation time – permittivity of solutions – breakdown – Strength of Glasses.

UNIT V: APPLICATIONS

Acoustical grating – sonar – depth of sea – measurement of velocity of blood flow and movement of heart – Ultrasonic imaging – High resolution images – Non destructive testing – Principle – Methods – Liquid penetrant method - - Ultrasonic flaw detector – X- ray Radiography and Fluoroscopy – Thermography - Applications of Ultrasonics in NDT.

OUTCOME

By the end of the course, the student will be able to

- Students can be exposed to know applications of ultrasonics in biomedical applications

BOOKS FOR STUDY

1. Fundamentals of Ultrasonics - J. Blitz, Second Edition, Plenum Press, New York, 1967.
2. Physical Acoustics - W.P. Mason, 1959.
3. Sonics-PP. Hueter and R.H. Bolt, Wiley, New York, 1955.

BOOKS FOR REFERENCE

1. Molecular Acoustics, J. Matheson, Wiley, New York, 1971.
2. Ultrasonics: Fundamentals, Technologies and Applications, Third Edition, Dale Emsminger, Leonard J. Bond, CRC Press, 2011.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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Semester: 5
Course : DSE2
Code : A5PHEL2A

Credits: 5
Hours/Week: 6
Medium: English and Tamil

ANALOG ELECTRONICS

(For Students admitted from 2022-2023)

OBJECTIVES

- To study the V-I characteristics of various linear electronic components
- To know about operational amplifiers and integrated circuits.

UNIT I: DIODES AND RECTIFIERS

Intrinsic and Extrinsic Semi-conductors -P N junction diode –Biasing-V-I characteristics- Rectifiers-Half wave-Full wave and Bridge rectifier - ripple factor - filters - L-section, π -section filters- Zener diode – V-I Characteristics-Zener voltage regulated power supply, Photo Diode – characteristics and applications.

UNIT II: TRANSISTORS

Bipolar Junction Transistors –construction – Mechanism of amplification – Modes of operation – Transistor static characteristics in CB and CE modes –Transistor biasing(voltage divider biasing) – Two port representation of a Transistor – Parameters- Determination of h-parameters.

UNIT III: SPECIAL DEVICES

Special semiconductor devices – FET, JFET, MOSFET (Construction and Working) - FET parameters – Comparison between FET and Transistor – SCR, UJT, DIAC and TRIAC characteristics- Application of SCR as relay and UJT as relaxation oscillator.

UNIT IV: AMPLIFIERS AND OSCILLATORS

Power amplifier – Class A power amplifier –Class B power amplifier - Push pull – Gain of amplifier with feedback – Effects of negative feedback – Oscillators – Concepts of feedback oscillators – Wein bridge – phase shift - Hartley- Colpitt's oscillators.

UNIT V: INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIERS

Integrated circuits- Classification- Fabrication of basic monolithic IC- Advantages and Disadvantages of IC.

Operational amplifier- Characteristics of ideal operational amplifier – Gain of inverting and non-inverting amplifier- Operational Amplifier parameters, CMRR - Applications – Sign changer, Scale changer, Adder, Subtractor, Integrator, Differentiator and Comparator.

OUTCOME

By the end of the course, the student will be able to

- infer knowledge about applications of components in linear electronic circuits

BOOKS FOR STUDY

1. Principles of Electronics – V.K. Mehta, Rohit Mehta- S.Chand and Company, New Delhi, 2019.
2. Basic Electronics and Linear Circuits –N.Bhargava, D.Kulshreshtha and Gupta, Tata McGraw-Hill Publishing Co, 1983.
Basic Electrical and Electronics Engineering – S. K. Bhattacharya – Pearson India Education services Pvt. Ltd, 2020.
3. Linear Integrated Circuits - D.Roy Choudhury and Shahil B Jain, New Age International Publishers, 2004.

BOOKS FOR REFERENCE

1. Electronic Devices and Circuits – Sarjeer Gupta – Dhaanpat rai Publications – New Delhi – Reprint, 2008.
2. Elements of Solid State Electronics – A. Ambrose and T.Vincent Devaraj – Mera Publications, 1993.
3. Basic Electrical, Electronics and Computer Engineering – R.Muthusubramanian, S. Salivahanan, K.A. Muraleedharan – Tata McGraw Hill publishing Co. Ltd., New Delhi – Reprint, 2004.
4. Basic Electrical Engineering- M.L.Anwani Dhanpat.Rain and Co, New Delhi- Reprint, 2008.
5. Electronic Devices and Circuits – Jacob Millman, Christos. C. Halkib – Tata McGraw Hill publishing Co., Ltd., New Delhi – Reprint, 2002.

Question Paper Pattern

Maximum Marks: 75 Marks

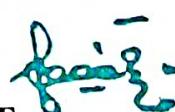
Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)


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THANJAVUR - 613 005.

Semester: 5
Course: DSE2
Code : A5PHEL2B

Credits: 5
Hours/Week: 6
Medium: English and Tamil

LASERS AND ITS APPLICATIONS

(For students admitted from 2022-2023)

OBJECTIVE

- To know the fundamentals of production and applications of LASERS.

UNIT I: FUNDAMENTALS OF LASER

Lasers – Characteristic properties – principles of lasers – absorption – spontaneous emission – stimulated emission – Einstein's theory of stimulated emission – population inversion – methods of achieving population inversion -2,3,4 level pumping schemes – Amplification and gain-Optical resonator and its action- Schawlow and Townes Threshold condition.

UNIT II: OPTICAL PROCESSES THEORY

Waves and interference – Coherence – Temporal and Spatial Coherence – Coherence of the field and the size of the source- coherence and monochromaticity -Line broadening mechanisms.

Cavity Configuration – Plane Parallel Cavity – Confocal, Hemispherical, Long Radius Cavity – Modes – Longitudinal And Transverse – Single Mode Operations-Properties of Laser modes.

UNIT III: TYPES OF LASERS

Introduction – Ruby Laser – Three level system-U3+ in CaF₂ Laser-A four level system-Nd:YAG laser-Construction and working – He-Ne laser – working principle – energy level diagram – Argon ion laser – Helium cadmium laser – molecular gas laser – CO₂ laser – principle – construction and working.

UNIT IV: DYNAMICS OF LASER PROCESSES

Production of a giant pulse – Q-switching – Mechanical shutter - Electro optical shutter-Shutter using saturable dyes-Peak power emitted-Laser amplifiers-Cavity dumping-Mode locking –Techniques for mode locking- Mode pulling – Hole burning.

UNIT V: APPLICATIONS OF LASERS

Holography – Optical communications-Interference-Testing of optical systems-NLO-Harmonic generation-Doppler free two photon spectroscopy-isotope separation -Lasers in computers – weapons – medical applications – industrial applications.

OUTCOMES

- To understand the working principle of LASER.
- To have the knowledge on practical applications of LASER.

BOOKS FOR STUDY

1. An introduction to lasers, theory and applications - M.N.Avadhanulu, S.Chand &Co., New Delhi , 2001.
2. Laser and Non-linear Optics – B.B.Laud- Wiley Publications, 1992.

BOOKS FOR REFERENCE

1. Lasers and their Applications – Beesley – Taylor and Francis – London, 1972.
2. Lasers principles and applications – J. Wilson, J.F.B. Hawkes – Prentice Hall, 1987.
3. Lasers theory and Applications-K.Thyagarajan, A.K.Ghatak, Cambridge University Press, 1981.
4. Engineering Physics - R.K.Gaur & S.L.Gupta (8th edition) Dhanpat Rai Publications, New Delhi, 2001.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR - 613 005.

Semester : 5
Course: DSE2
Code: A5PHEL2C

Hours/Week: 6
Credits: 5
Medium: English and Tamil

ASTRONOMY

(For Students admitted from 2022-2023)

OBJECTIVES

- To study the motion of moon
- To acquire knowledge on eclipses
- To know about astronomical instruments and solar system .

UNITI: THE SUN

Morphology of Sun – Solar activities: Sun spots – Cycle – Sun Flares – Solar Wind – Sun temperature – Energy output.

UNITII: THE MOON

Introduction – sidereal month- synodic month –daily motion of the moon – age of the moon – phase of moon – position of moon at rise and setting.

UNIT III: ECLIPSES

Introduction – Umbra and Penumbra – Lunar eclipse – solar eclipses – duration of lunar and solar eclipse – comparison of solar and lunar eclipses.

UNIT IV: ASTRONOMICAL INSTRUMENTS

Sidereal clock – chronometer – gnomon – sundial – the heliometers- chronograph-radio telescope.

UNIT V: SOLAR SYSTEM

The sun – mercury – Venus – mars – Jupiter- Saturn – Uranus – Neptune – Pluto.

OUTCOMES

By the end of the course, the student will be able to

1. Understand the motion of moon and eclipses
2. Know the working of astronomical instruments

BOOKS FOR STUDY

1. Astronomy –S. Kumaravelu, Susheela Kumaravelu, 2013.
2. Introduction to Astronomy and Cosmology – Ian Morison, Wiley, 2008.

BOOKS FOR REFERENCE

1. Fundamentals of Astronomy- H.Karttunen, P. Kroger, H. Oja, M.Poutanen, K.J Donner, Springer 2007.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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PHYSICS FOR COMPETITIVE EXAMS

(For students admitted from 2022-23)

OBJECTIVES

- To acquire general knowledge in physics for competitive exams,
- To understand basic formulae in physics,
- To acquire simple problem solving skills,
- To prepare for UPSC, SSC, RRB, TNPSC etc,

GENERAL KNOWLEDGE IN PHYSICS

UNIT I: IMPORTANT STUDIES IN PHYSICS

Important inventions and discoveries in physics - current inventions in physics (In the last three Years) - Important instruments and devices in physics; usage and working principle-Abbreviations in physics – Nobel prize winners in physics for the last five years, Units and dimensions, Exploration of our planets.

UNIT II: PHYSICISTS

Physicist and their findings: Galileo, Newton, Einstein, Maxwell, Marry Curie, Niel Bohr, Dirac, Plank, Schrodinger, Astronauts and cosmonauts their achievements: Yuri Gagarin, Valentina Tereshkova, Alexei Leonov and Svetlana Savitskaya (space walk), Indian scientists and their findings: C.V. Raman, Vikram Sarabhai, Homi Bhabha, S.N. Bose, Mehanatha Saha, S.Chandrasekar, E.C.G.Sudarshan, J.V.Narlikar. - Rakesh Sharma, Kalpana chawla

UNIT III: NATIONAL PHYSICS RESEARCH INSTITUTES, LAUNCHING AND TESTING CENTRES

LOCATION AND SIGNIFICANCE OF

National research institutes: IUCAA, IISc, BARC, ISRO, TIFR, CLRI, PRL, PRI, CECRI, VSSC, IGCAR, CIPET, CAT, NPL, NCL, IISER, RRI, HA.

Power Plants: Thermal power plant (Mettur and Tuticorin), Nuclear power plant in (Kudankulam)

Satellite launching centres : Satish Dhawan Space Centre, Shriharikota Island(AP), Vikram Sarabai Space Centre Thiruvananthapuram(KER).

Missile Rocket Testing stations- Balasore, Odisha, Abdul Kalam Island, Odisha – Thumba, Equatorial Rocket launching station: Thiruvananthapuram(Kerala).

PHYSICS IN GENERAL SCIENCE FOR COMPETITIVE EXAM

ANY FIVE IMPORTANT BASIC CONCEPTS/ LAWS/FORMULAE.

UNIT IV: Motion , Work, Energy and Power, Gravitation, Pressure, Floatation, Surface tension, Viscosity, Elasticity, Simple harmonic motion, Wave, Sound wave.

UNIT V: Heat and thermodynamics, Light, Static electricity, Magnetism, Atomic and nuclear physics, Radioactivity, Nuclear fission and fusion, Electromagnetism, Four fundamental forces, energy sources.

OUTCOMES

By the end of the course, the student will be able to

- Answer various physics questions in competitive exams
- Acquire knowledge and skill in general aspects of physics

BOOKS FOR STUDY

Department study materials

BOOKS FOR REFERENCE

1. Physics - Haliday & Resnick-John Wiley volume (I&II).
2. Handbook of Physics – Walter Benenson John W. Harris and Holger Lutz, Springer, 2002.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $5 \times 6 = 30$ Marks Answer All Questions (Either or Type- Two Questions from each unit)

Part-B $3 \times 15 = 45$ Marks (Three out of Five-one question from each unit)


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ENERGY PHYSICS (For Students admitted from 2022-2023)

OBJECTIVE

- To study various sources of energies other than the conventional non-renewable energies.

UNIT I: INTRODUCTION TO ENERGY SOURCES

Energy sources – Types of energy sources – World energy futures- Energy sources and their availability – Prospects of renewable energy sources.

UNIT II:SOLAR CELLS

Solar Cells: Solar cells for direct conversion of solar energy to electric powers – Solar cell parameter – Solar cell electrical characteristics – Efficiency – Single crystal silicon solar cells – Polycrystalline silicon solar cells – Cadmium sulphide solar cells.

UNIT III:APPLICATIONS OF SOLAR ENERGY

Solar water heating – space heating and space cooling – solar photo voltaic – agricultural and industrial process heat – solar distillation – solar pumping– solar furnace – solar cooking – solar green house.

UNIT IV:WIND ENERGY

Base principles of wind energy conversion wind data and energy estimation – Base components of wind energy conversion systems (WECS) types of wind machines – Generating systems – scheme for electric generation – generator control – load control – applications of wind energy.

UNIT V:ENERGY FROM BIOMASS

Biomass conversion Technologies – wet and Dry process – Photosynthesis- Biogas Generation: Introduction – basic process and energetic – Advantages of anaerobic digestion – factors affecting bio digestion and generation of gas – Classification of Biogas plants: Continuous and batch type – the done and drum types of Bio gas plants – biogas from wastes fuel – properties of biogas – utilization of biogas.

OUTCOME

By the end of the course, the student will be able to

- Concentrate on the various sources of renewable energies.

BOOKS FOR STUDY

1. F. Kreith and J.F. Kreider, Principles of Solar Engineering, Tata McGraw Hill (1978).
2. A.B. Meinel and A.P. Meinel, Applied Solar Energy, Addison Wesley Publications (1976).

BOOKS FOR REFERENCE

1. M.P. Agarwal, Solar Energy, S. Chand and Co., New Delhi (1983).
2. S.P. Sukhatme, Solar Energy, Tata McGraw Hill (1997).

Question Paper Pattern

Maximum Marks: 100 Marks

Exam Duration: 3 Hrs

$5 \times 20 = 100$ (either or type two questions from each unit)


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Semester: 6
Course: CC11
Code : A6PH6

Credits: 6
Hours/Week: 7
Medium: English and Tamil

WAVE MECHANICS AND NUCLEAR PHYSICS

(For students admitted from 2022-23)

OBJECTIVES

- To study the wave nature of matters and their physical interpretations.
- To acquire the knowledge on properties of nuclei and its stability.
- To understand the working of detectors and accelerators.

UNIT I: DUAL NATURE OF MATTER

Dual nature of light –De' Broglie's concept of matter waves – De' Broglie wavelength – Wave and group velocity – Relation between wave and group velocity – Davisson and Germer experiment – G.P. Thompson experiments – Heisenberg's Uncertainty Principle.

UNIT II: WAVE MECHANICS

Basic Postulates of wave mechanics – Quantum operators, Linear operator, Hermitian operator, Parity operators – Properties of wave Function – Orthogonal and normalized wave functions – Eigen Values and Eigen Functions – Schrodinger's equations – Time independent – Time dependent – Application: Particle in a box.

UNIT III: STRUCTURE OF THE NUCLEUS

Classification of Nuclei – General properties of nucleus – charge, radius, mass, density, angular momentum and dipole moments –Mass defect - Binding energy– Packing fraction – Nuclear stability – Semi empirical mass formula – Liquid drop model – Shell model.

UNIT IV: RADIOACTIVITY, DETECTORS AND ACCELERATORS

Radioactivity: Properties of Alpha, Beta and Gamma rays – Geiger-Nuttal Law – Soddy Fajan's displacement law – Radioactive disintegration Law – Half life, Mean life periods. Radiation Hazards - Nuclear waste disposal. Detectors: G.M counter, Accelerators: Cyclotron-Betatron.

UNIT V: NUCLEAR REACTIONS AND ELEMENTARY PARTICLES

Types of nuclear reactions – Energy balance – Q value – Nuclear fission – Chain reaction – Basics of nuclear reactor - Nuclear fusion – Thermo nuclear reactions = Carbon-Nitrogen cycle – Proton-Proton cycle, Hydrogen bomb.

Elementary particles: Four fundamental Interactions – classification of elementary particles,

OUTCOMES

By the end of the course, the student will be able to

- Know the fundamental concepts of wave nature of particles.
- Understand on the basics of nuclear physics.

BOOKS FOR STUDY

1. Modern Physics - R.Murugesan, Kiruthiga Sivaprasath- S.Chand and company, New Delhi 2007.
2. Concepts of Modern Physics – Arthur Beiser –Tata McGraw –Hill Publishing Company Limited, New Delhi, 2002.
3. Modern Physics - J.B. Rajam, S. Chand & Co New Delhi 1980.
4. Essentials of Nuclear Chemistry – Hari Jeevan Arnikar, Wiley, 1982.
5. Nuclear physics- Irving Kaplan, Wesley, 1977.

BOOKS FOR REFERENCE

1. Nuclear physics – D.C.Tayal – Himalaya Publicity House, Mumbai – 2014.
2. Elements of nuclear physics – Mc Pandya and RPS Yadav, Kedarnath Ram Nath, Meerut, 1986.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

28.1.2018
HOD HEAD,
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Semester: 6
Course: CC12
Code : A6PH7

Credits: 6
Hours/Week: 7
Medium: English and Tamil

DIGITAL ELECTRONICS

(For students admitted from 2022-23)

OBJECTIVES

- To acquire knowledge on number system, arithmetic operations and codes,
- To understand the fundamental concepts of logic gates and Boolean algebra.
- To understand arithmetic, combinational and sequential circuits

UNIT I: NUMBER SYSTEM AND CODES

Number System: Binary, Decimal, Octal and Hexadecimal numbers and Conversion
– Binary arithmetic operations – Addition, subtraction, multiplication and division - 1's and 2's complement subtraction. Binary Codes: 8421, Excess 3, Gray and ASCII codes.

UNIT II: LOGIC GATES AND BOOLEAN ALGEBRA

Logic Gates: AND, OR, NOT, NAND, NOR and EX-OR gates, NAND and NOR as universal gates. Boolean algebra: Basic laws of Boolean algebra – De Morgan's theorem
– karnaugh map – minterms and maxterms – 2, 3 and 4 variable k-maps - Sum of Products and Product of Sums.

UNIT III: ARITHMETIC AND COMBINATIONAL CIRCUITS

Arithmetic circuits: Half adder - Full adder - Half Subtractor - Full Subtractor - BCD adder. Combinational Circuits: Multiplexer – Demultiplexer –Decoders – Encoders.

UNIT IV: SEQUENTIAL LOGIC CIRCUITS

Flip-Flops: S-R Flip-flop - Clocked S-R Flip-flop - D Flip-flop and T Flip-flop - J-K Flip-flop - Master-slave Flip-flops. Registers: Left Shift Registers & Right shift register. Counters: 4bit asynchronous counter, 4bit synchronous counter, Decade counter – MOD counter - Up-Down counter.

UNIT V: 555 -TIMER AND CONVERTERS

555 Timer pin configuration - 555 Timers as Schmitt trigger - 555 timer as monostable multivibrator - Digital to analog converter: Binary Weighted D/A Converter - R-2R resistive ladder D/A converter. Analog to digital converter: counter type ADC – successive approximation A/D converter.

OUTCOMES

By the end of the course, the student will be able to

- Understand the number system and basic logic gates.
- Simplify and design Boolean expressions using Boolean laws and K- Map.
- Construct combinational and sequential circuits.

BOOKS FOR STUDY

1. Digital Principles and Applications – Albert Paul Malvino and Donald P. Leach Tata McGraw Hill 2011.
2. Digital logic and computer design-M.Morris Mano-Prentice-Hall of India private limited-New Delhi-1995.
3. Digital Electronics, S. Salivahanan, S. Arivazhagan Vikas Publishing House, 2010.
4. Digital Electronics, Anil. K. Maini Wiley Publications, 2008.
5. Linear Integrated Circuits, D.Roy Choudhury and Shahil B Jain, New Age International Publishers, 2004.

BOOKS FOR REFERENCE

1. Fundamentals of Digital Circuits, A. Anand Kumar PHI, 2003
2. Integrated Circuits, K.R. Botkar, Khanna Publishers, 2004

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

23.01.2015

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Semester: 6
Course: CC13
Code: A6PHP6

Credits: 5
Hours/Week: 7
Medium: English and Tamil

MAJOR PRACTICAL – VI

(For students admitted from 2022-23)

OBJECTIVES

- To develop observation and computation skills.
- To develop skills in handling instruments.
- To get practical knowledge on various general and electronics experiments
- To acquire programming skills in C language.

(Minimum fourteen Experiments)

1. Young's Modulus-Koenig's method (Uniform Bending).
2. Spectrometer – Small angled prism.
3. Spectrometer – Dispersive power of grating.
4. B.G. – Comparison of capacitances.
5. B.G. – Comparison of mutual inductances.
6. Potentiometer – EMF of a Thermocouple.
7. Potentiometer – Temperature coefficient of Thermistor.
8. Colpitt's Oscillator - Frequency and Self-inductance.
9. Operational Amplifier – Differentiator and Integrator.
10. Simplification of Boolean Theorems.
11. Simplification of Boolean expressions by Karnaugh map.
12. Study of Flip Flops.
13. Half Subtractor, Full Subtractor using basic logic gates.
14. Microprocessor- 8-bit Multiplication and Division.
15. Microprocessor – Arrange an array of data in ascending and descending order.
16. C-Programming - Convert the given temperature from Celsius to Fahrenheit and from Fahrenheit to Celsius.
17. C-Programming – Factorial of N numbers.
18. C- Programming – Biggest and Smallest number from the given array.
19. C - Programming – Ascending and descending order of an array.

OUTCOMES

By the end of the course, the student will be able to

- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Understand the validity of basic laws and theories to determine various properties of materials.
- Understand the application of various experiments in our day to day life.
- Apply the knowledge of the fundamentals of physics and instrumentation to arrive at a solution for various problems.
- Acquire programming skills in C language.

Maximum Marks-60

Exam Duration: 3 Hours

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Semester: 6
Course: DSE3
Code : A6PHEL3A

Credits: 5
Hours/Week: 7
Medium: English and Tamil

MICROPROCESSOR AND PROGRAMMING IN C

(For Students admitted from 2022-23)

OBJECTIVES

- To know the fundamentals of computers and microprocessor.
- To introduce computer programming in C.

UNIT I: BASICS OF DIGITAL COMPUTER AND INTEL 8085 ARCHITECTURE

Basic components of a digital computer - Buses - Hardware, Software and Firmware - Memory - Semiconductor memories - RAM,ROM, EPROM & EEPROM.

INTEL 8085 - Architecture - Pin Configuration - Various registers – Flags

UNIT II: INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING

Addressing modes: Direct, Register, Register indirect, Immediate and implicit addressing. Instruction set: Data transfer group - Arithmetic Group - Logical group - Branch control group- stack, I/O and Machine control group.

Assembly language programming: Addition - Subtraction - Multiplication -Division of two 8- bit numbers —Finding the largest or smallest number in a data array-Arranging a list of numbers in ascending or descending order.

UNIT III: INTRODUCTION TO C

Fundamentals of C –Basic structure of C program – Character set – C tokens- Keywords and identifiers –Constants – Variables - Data types – Declarations and assigning values to the variables –Symbolic constants.

UNIT IV: OPERATORS, EXPRESSION DATA INPUT AND OUTPUT FUNTIONS

Operators and Expressions: Arithmetic Operators-Unary Operators – Relational and Logical Operators - Assignment and Conditional operators - Increment and Decrement operators – Bitwise and special operators– Arithmetic Expression - Library function.

Data input and output functions- get char, put char, scanf, printf, gets and puts functions.

UNIT V: CONTROL STATEMENTS AND WRITING PROGRAMS

Decision making and branching: if, if...else, nested if else, else if ladder-switch, break, continue and goto. Decision making and Looping: while, do-while, for, Nested for loops- Arrays (one and two dimensional arrays) - Declaration, Initialization of arrays.

Write a C program for conversion of the given temperature from Celsius to Fahrenheit and from Fahrenheit to Celsius, Factorial of N numbers, Biggest and Smallest number from the given array, Ascending and Descending order of an array.

OUTCOMES

By the end of the course, the student will be able to

- Know the basic ideas of microprocessor.
- Acquire skills in programming instructions sets of microprocessor.
- Understand and apply programming skills in C.

BOOKS FOR STUDY

1. Fundamentals of Microprocessors and Microcomputers, B.Ram, Dhanpat Rai publication Pvt. Ltd., New Delhi 2006.
2. Fundamentals of microprocessor 8085- V. Vijayendran, S.Vishwanathan publishers, Chennai (2003).
3. Programming in ANSI C -E. Balagurusamy – Tata McGraw Hill Pub. Co.(2008).
4. Programming with C – Byron S Gottfried and Jitender Kumar Chhabra – McGraw Hill Education (India) Private Limited, 2019.

BOOKS FOR REFERENCES

1. Microprocessor Architecture, Programming and Applications With the 8085, Ramesh.S.Goankar, Penram International Publishing (India) Pvt. Ltd.(2002).
2. Programming with C - Venugopal, K.R. And Sudep, R.P.- Tata McGraw Hill Publications Co. Ltd.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one questions from each unit)

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Semester: 6
Course: DSE3
Code : A6PHEL3B

Credits: 5
Hours/Week: 7
Medium: English and Tamil

X-RAY CRYSTALLOGRAPHY AND BIOPHYSICS

(For students admitted from 2022-2023)

OBJECTIVE

- To know about the crystal, bio molecular structures.

UNIT I: X-RAY AND CRYSTALS

Origin of X-rays – conventional generators-construction and geometry sealed tube- rotating anode generator-choice of radiation-Synchrotron radiation - Lattice planes-Miller indices - X-ray diffraction - Crystal systems and symmetry – unit cell – space lattices- non primitive lattices – point groups-space groups – analysis of space group symbols - Crystallization – growing crystals – choosing a crystals – crystal mounting- alignment–measurement of crystal properties.

UNIT II: DATA REDUCTION

Integration of intensity - Lorenz and Polarization corrections – absorption – deterioration or radiation damage – scaling – Interpretation of Intensity - Structure factors and Fourier syntheses: Structure factor – Friedel's Law – exponential and vector form – generalized structure factor – Fourier synthesis – Fast Fourier transform – Anomalous scattering and its effects. Calculation of structure factors and fourier synthesis.

UNIT III: PHASE PROBLEM

Methods of solving Phase Problem: Direct methods – Patterson methods – Heavy atom methods. Refinement of crystal structures: Weighting – Refinement by Fourier syntheses – Locating Hydrogen atoms identification of atom types – least squares – goodness of fit – least square and matrices-correlation coefficients – Relationship between Fourier and Least squares – Practical consideration in least squares methods.

UNIT IV: CELL ORGANELLES AND MOLECULES

Basic structure of prokaryotic and eukaryotic cells – mitochondria and the generation of ATP – Chemical composition of living systems – molecular components of cell – chemical structure of carbohydrate-Lipids-proteins- Nucleic acids-hetro macro molecules.

Molecular interactions: Molecular forces – forces hold macro molecules together–intermolecular weak forces – van der Waals – inductive force – dispersion force – Lenard-Jones potential – hydrogen bond – hydrophobic forces – acid, bases and pH, pK, pI and buffering.

UNIT V MACROMOLECULAR STRUCTURE

Nucleic acid structure – conformation of monomers and polymers – double helical structure of DNA – polymorphism of DNA – DNA super coiling – structure of transfer RNA. Protein structure – amino acids – primary structure – peptide bond – secondary structure – α -helix and β - sheet – tertiary and quaternary structure – Virus structure.

OUTCOME

By the end of the course, the student will be able to

- infer about the fundamentals of crystallography and biomolecules

BOOKS FOR STUDY

1. X-ray Structure Determination, Second Edition, Stout and Jensen, John Wiley Publications.
2. Fundamentals of Crystallography, Second Edition, C. Giacovazzo, Oxford Press.
3. Structure Determination by X-ray Crystallography, Second Edition, Ladd and Palmer.
4. Molecular Biophysics, Structure in motion, M. Duane, Oxford University Press.
- 5.

BOOKS FOR REFERENCE

1. Principles of Physical Biochemistry, K.E. Van Holde, N.C. John and P.S. Ho, Prentice Hall Publications.
2. Biophysics, M.V. Volkenshtein, Mir Publications, Moscow.
3. Practical Protein Crystallography, Duncan E. McRee, Academic Press Publications.
4. Elements of X-ray crystallography, Leonid V. Azaroff, McGraw Hill Publications.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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THANJAVUR - 613 005.

Semester: 6
Course: DSE3
Code : A6PHEL3C

Credits: 5
Hours/Week: 7
Medium : English and Tamil

PRINCIPLES OF COMMUNICATION SYSTEMS

(For Students admitted from 2022-2023)

OBJECTIVE

- To know about the electromagnetic radiations in signal propagations and their instrumentation systems

UNIT I: WAVE PROPAGATION

EM waves – Free space propagation – Surface wave propagation – sky wave propagation – space wave propagation – Tropospheric scatter propagation – Structure of Atmosphere – Virtual height – MUF – Lowest Usable Frequency – Skip Distance – Optimum Working Frequency – Ionospheric abnormalitiesduct Propagation.

UNIT II: ANTENNAS

Electromagnetic radiations – Elementary doublet – Current and Voltage Distribution – Resonant antennas, radiation patterns and length calculations – Non resonant antennas – Antenna gain and Effective radiated power – Antenna resistance – Bandwidth, Beam width and Polarization –
Grounded and Ungrounded antennas – Effects of height – Feed point – Couplers – Impedance matching – Dipole Arrays - Yagi Uda antenna – Parabolic antenna – Horn and Lens antenna – Helical antenna - Transmission line.

UNIT III: MODULATION TECHNIQUES

Introduction to Communication Systems – Information – Transmitter – Channel – Noise – Receiver – Need for Modulation Band width requirement – Amplitude modulation: AM Theory – frequency spectrum of AM wave –Representation of AM – Power relations in AM wave – AM Transmitter block diagram – Frequency modulation – System description – Mathematical representation – Frequency Spectrum – Generation of FM – Direct and Indirect methods.

UNIT IV: SINGLE SIDEBAND MODULATION

Introduction – Principles – Balanced modulator – SSB Generation: Filter method, Phase shift method and Third method – SSB Reception: Pilot Carrier SSB and Independent Side band – vestigial sideband transmission – Introduction to PAM, PWM, PPM and PCM.

UNIT V: COMMUNICATION SYSTEMS

Introduction – Super heterodyne Receiver – Choice of IF and Oscillator Frequencies – Image Rejection – Adjacent Channel Selectivity – spurious response - Tracking – AGC – Double conversion receiver - RADAR principle – 12 Satellite communication fundamentals – Up Link – Down Link – Transponder – Multiplexing technique – Basics of mobile communication.

OUTCOME

By the end of the course, the student will be able to

- infer basic ideas about wireless communication systems

BOOKS FOR STUDY

1. Kennedy and Davis, Electronic Communication Systems, Tata McGraw Hill, 8th Edition, 1999
2. Dennis Roddy and John Coolen, Electronic Communications, PHI, 4th edition, 1995
3. K.D. Prasad, Antenna & Wave Propagation, Satya Prakashan, 2012.

BOOKS FOR REFERENCE

1. Anok Singh & A.K. Chhabra, Principles of Communication Engineering, S.Chand & Company Ltd, 6th Edition, 2007.
2. NIIT, Basics of Electronic Communication, Prentice Hall India Pvt. Ltd, 2004.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one questions from each unit)

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CRYSTAL GROWTH AND THIN FILM PHYSICS

(For Students admitted from 2022-2023)

OBJECTIVE

- To study the synthesis and growth of materials by various techniques

UNIT I: NUCLEATION AND GROWTH

The crystalline state - concept of crystal growth – crystal growth theory : classical theory – Gibbs – Thomson equation- kinetic theory of nucleation – Energy of formation of a nucleus – kinetics of thin film formation – Film growth – five stages – Incorporation of defects and impurities in films – Deposition parameters and grain size – Structure of thin films.

UNIT II:GROWTH TECHNIQUES

Solution growth technique: Low temperature solution growth: solution - Solubility – constant temperature bath and crystallizer – seed preparation and mounting - Gel growth technique: Principle – various types –Experimental procedure – Advantage of gel method. Melt technique: Bridgman technique – Experimental arrangement – Growth process. Vapour technique: Physical vapour deposition (PVD)

UNIT III:THIN FILM DEPOSITION TECHNIQUES

Thin films – Introduction to vacuum technology – deposition techniques – physical methods – resistive heating, electron beam gun and laser gun evaporation – Sputtering: Reactive sputtering, radio frequency sputtering – Chemical methods: Spray pyrolysis – preparation of transport conducting oxides.

UNIT IV:CHARACTERIZATION TECHNIQUE

X-ray Diffraction (XRD) – powder and single crystal – Fourier transform infrared analysis – FT-Raman analysis — Scanning electron microscopy (SEM) – Energy dispersive x-ray (EDX) analysis - UV-VIS Spectroscopy - Photo luminance (PL) –AFM– Hall effect – X-ray photoelectron spectroscopy (XPES) – Dynamic light scattering – Ellipsometry method

UNIT V:APPLICATIONS

Micro electro Mechanical systems (MEMS) – Optoelectronic devices: LED, LASER and solar cell – polymer films – Fabrication and characterization of thin film transistor, capacitor, and resistor – Sensor – Applications of ferromagnetic and super conducting films: Data storage, Giant magneto resistance (GMR).

OUTCOME

By the end of the course, the student will be able to

- know about the applications of synthesized materials

BOOKS FOR STUDY

1. A. Goswami, Thin Film Fundamentals, New Age International (P) Ltd. Publishers, New Delhi (1996)
2. P. Santhana Ragavan, P. Ramasamy, Crystal Growth and Processes, KRU Publications, Kumbakonam (2000).
3. J.C. Brice, Crystal Growth Process, John Wiley Publications, New York (1996).
4. K. Sangawal, Elementary Crystal Growth, Shan Publisher, UK (1994).
5. L.I. Maissel and R. Clang, Hand book of Thin Films Technology, McGraw Hill (1970).

BOOKS FOR REFERENCE

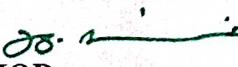
1. J.L. Vossen and W. Kern, Thin Films Process, Academic Press (1978).
2. M. Ohring, the Materials Science of Thin Films, Academic Press (1992).
3. M. William and D. Steve, Instrumental Methods of Analysis, CBS publishers, New Delhi (1986).
4. H.H. Williard, L.L. Merritt, M.J. Dean, and F.A. Settle, Instrumental Methods Of Analysis, Sixth Edition, CBS Publishers and distributors, New Delhi (1986).
5. R.W. Berry, P.M. Hall and M.T. Harris, Thin Film Technology, Van Nostrand, New York (1968).

Question Paper Pattern

Maximum Marks: 100 Marks

Exam Duration: 3 Hrs

$5 \times 20 = 100$ (either or type two questions from each unit)


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THANJAVUR - 613 005.

Semester : 3
Course : Allied 1
Code : A3AP1

Credits: 4
Hours/Week: 4
Medium: English and Tamil

ALLIED PHYSICS – I

OBJECTIVE

- To understand the basic concepts of , properties of matter, mechanics, thermal physics, optics and sound.

UNIT I: PROPERTIES OF MATTER

Hooke's Law – Stress – Strain – Elastic Moduli – Bending of beams – Expression for bending moment – Non Uniform bending – Expression for depression - Determination of Young's modulus – Definition and dimensions of surface tension – Experimental determination of surface tension of liquid and interfacial surface tension by drop weight method – Viscosity – Experimental determination of coefficient of viscosity of liquid by Poiseuille's flow method.

UNIT II: MECHANICS

Centre of gravity – Determination of C.G – Centre of gravity of a solid hemisphere and Solid cone – Gravitation: Kepler's law of planetary motion – Newton's laws of gravitation – Deduction of Newton's law of gravitation from Kepler's law – Boy's method of determination of G – Variation of 'g' with latitude, altitude and depth.

UNIT III: THERMAL PHYSICS

Laws of thermodynamics – Isothermal and adiabatic changes – Work done – Reversible and irreversible process – Carnot’s theorem – Newton’s Law of cooling – Stefan’s law of radiation - Newton’s law from Stefan’s law – Black body radiation – Solar constant – Measurement of solar constant – Angstrom’s pyrheliometer – Temperature of the sun.

UNIT IV: OPTICS

Electromagnetic Spectrum – Spectral response of human eye – UV and IR spectroscopy – Raman effect – Experimental arrangement – Application of Raman effect – Laser – Spontaneous and stimulated emission – Population inversion – Metastable state – He-Ne laser

UNIT V: SOUND

Laws of transverse vibrations – Sonometer – Verification of laws – Music and noise – Characteristics of musical sound – Reverberation and Reverberation time – Conditions for good acoustics – Ultrasonics – Properties - Production – Piezo electric oscillator method - Applications.

OUTCOMES

By the end of the course, the student will be able to

- Understand center of gravity, Kepler's law and gravitation.
- Get the idea of sound and ultrasonics.
- Know the properties of matter.
- Understand thermodynamics laws, radiation laws and measurement of heat.
- Know interaction of light with matter.

BOOKS FOR STUDY

1. Mechanics - D.S.Mathur .S.Chand & Co New Delhi, 2012.
2. A Text Book of Sound - Brijlal and Subramanian S.Chand & Co New Delhi, 2011.
3. Heat and Thermodynamics - Brijlal and Subramanian. S.Chand & Co New Delhi, 2013.
4. A text book of Optics - Brijlal and Subramaniam. S.Chand & Co New Delhi; 2013.

BOOKS FOR REFERENCE

1. Properties of Matter - R.Murugesan. S.Chand & Co New Delhi, 2012.
2. Allied Physics Paper I - A.Sundaravelusammy. Priya Publications. 2012.

Question Paper Pattern

Maximum Marks: 75 Marks

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one questions from each unit)

Exam Duration: 3 Hrs

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Semester: 4
Course : Allied 2
Code : A4AP2

Credits : 4
Hours/Week : 4
Medium: English and Tamil

ALLIED PHYSICS – II

(For students admitted from 2022-2023)

OBJECTIVE

- To understand the concept of electrostatic, electricity and modern physics

UNIT I: ELECTROSTATICS

Coulomb's law – Gauss theorem – Applications – Mechanical force on the surface of charged conductor – Capacitors – Principle of a capacitor - Capacity of spherical capacitor – Cylindrical capacitor – Energy of a charged capacitor - Loss of energy due to sharing of charges.

UNIT II: ELECTRICITY

Kirchhoff's Laws – Wheatstone's bridge – Meter Bridge – Carey Fosters bridge – Determination of specific resistance – Potentiometer – low range voltmeter calibration - Laws of Electromagnetic induction – Self induction – Raleigh's method of finding self inductance of a coil – Mutual induction – Absolute determination of M – Coefficient of coupling.

UNIT III: ATOMIC PHYSICS

Quantum numbers – Vector atom model – Pauli's exclusion principle – X-rays – Continuous and characteristic X-rays – Mosley's law and its importance - Bragg's law – Bragg's spectrometer – Powder crystal method.

UNIT IV: NUCLEAR PHYSICS

General properties of nucleus – charge, radius, mass, density— Packing fraction – mass defect- Binding energy-Liquid drop model – particle accelerators – Cyclotron – Nuclear fission – Chain reaction – Atom bomb – Nuclear fusion – hydrogen bomb .

UNIT V: ELECTRONICS AND DIGITAL ELECTRONICS

Semiconductors – Junction diode and Zener diode – Characteristics study – Transistor – Working - Characteristics of transistor in CB configuration – Number systems – Binary, Decimal, Octal and Hexa-decimal conversions – Basic and universal logic Gates – Demorgan's Theorem – Verification.

OUTCOME

By the end of the course, the student will be able to

- understand the concepts of electrostatic, electricity and modern physics

BOOKS FOR STUDY

1. Electricity and Magnetism – Brijlal and Subramaniam S.Chand & Co New Delhi, 2013.
2. Modern Physics – R.Murugesan S.Chand & Co New Delhi, 2014.
3. Principles of Electronics – V.K Mehtha S.Chand & Co New Delhi, 2013.
4. Digital Principles and Applications – Albert Paul Malvino and Donald P. Leach, Tata McGraw Hill 2011.

BOOKS FOR REFERENCE

1. Concepts of Modern Physics – Arthur Beiser, Tata McGraw – Hill publishing Company Limited, New Delhi, 2002.
2. Allied Physics II – A. Sundara velusamy Priya Publications, Karur, 2012.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)


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Semester: 4
Course : Allied Practical
Code : A4APP

Credits: 4
Hours/Week: 3
Medium: English and Tamil

ALLIED PRACTICAL

(For students admitted from 2022-2023)

OBJECTIVES

- To develop observation and computation skills.
- To develop skills in handling instruments. To get practical knowledge on various general and electricity experiments to in physics

(Minimum Fourteen experiments)

1. Non uniform bending – Pin and Microscope.
2. Uniform bending – Pin and Microscope.
3. Non uniform bending – Scale and Telescope.
4. Uniform bending - Scale and Telescope.
5. Surface Tension and Interfacial Tension – Drop Weight Method
6. Coefficient of Viscosity of liquid – poiseuille's flow method.
7. Specific heat capacity of liquid by cooling Method
8. Lee's Disc – Thermal Conductivity of Bad Conductor
9. Spectrometer- Refractive index of Solid Prism.
10. Spectrometer – Grating – Normal incidence method
11. Newton's Rings – Radius of curvature of a convex lens
12. Sonometer – Verification of Laws
13. Meter Bridge – Determination of specific Resistance
14. Meter Bridge – Verification of laws of Resistance in Series and Parallel
15. Carey Foster's Bridge – specific Resistance
16. Potentiometer – Calibration of low range voltmeter
17. Characteristics of a junction diode
18. Characteristics of a zener diode
19. AND, OR, NOT, NAND and NOR logic gates – Using ICs.
20. Verification of Demorgan's theorem.

OUTCOMES

By the end of the course, the student will be able to

- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Understand the validity of basic laws and theories to determine various properties of materials.
- Understand the application of various experiments in our day to day life.

BOOKS FOR REFERENCE

1. A textbook of practical physics – M.N Srinivasan and others – Sultan Chand & sons, New Delhi.
2. Practical Physics – A. DhanaLakshmi and K.R. Paramasivam – Apsara Publication, Tiruchirapalli.

Maximum Marks-60

Exam Duration: 3 Hours

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Semester: 3
Code : A3ACSP1
Medium: English and Tamil

Credits: 4
Hours/Week: 4

APPLIED PHYSICS – I

(For students admitted from 2022-23)

OBJECTIVES

- To understand electrostatics, magneto statics and electro dynamics.
- To study the various laws and its application in current electricity.
- To acquire knowledge about electromagnetic induction and alternating current.

UNIT I: ELECTROSTATICS

Coulomb's law – Gauss theorem - Application -Mechanical force on the surface of a charged conductor- Potential energy stored per unit volume in an electric field - Capacitors- Principles of a capacitor -Capacity of spherical capacitor -Energy of a charged capacitor - Loss of energy due to sharing of charges.

UNIT II: MAGNETOSTATICS

Magnetic field- magnetic flux density – magnetization – Intensity of magnetization- Permeability – Susceptibility – relation between them – magnetic potential – potential due to a dipole – relation between potential and intensity – magnetic shell and its potential at any point – Properties of dia, Para and ferromagnetic materials.

UNIT III: CURRENT ELECTRICITY

Ohm's law – Laws of resistance in series and parallel - Kirchhoff's law- Wheatstone bridge –Meter bridge - Carrey Foster's bridge – Determination of specific resistance– Potentiometer – Measurement of current and resistance– Calibration of low range voltmeter.

UNIT IV: ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction- Relation between induced emf and mutual induction – self-induction by Rayleigh' method – mutual induction– absolute determination of M – coefficient of coupling – Transformer principle, construction and working.

UNIT V: ALTERNATING CURRENT

A/C circuits with single components- Circuit with RL, RC, and LC -measurement of current and voltages – power in an AC circuit – Power factor- LCR – Series and Parallel resonant circuits – Choke coil.

OUTCOMES

By the end of the course, the student will be able to

- Understand various concepts in electrostatics and magneto statics.
- Know the basics of current electricity and electromagnetic induction.

BOOKS FOR STUDY

1. Applied physics – Paper I –A.Sundaravelusamy – Priya publications Karur 2012.
2. Electricity and Magnetism – Brijlal and Subramanian, Ratan Prakashan Mandir, New Delhi, 2000.
3. Electricity and Magnetism – Narayananmurthy & Nagarathinam..

BOOKS FOR REFERENCE

1. Electricity and Magnetism –D.L. Seghal, K.L. Chopra and N.K. Sehgal.
5th Edition S. Chand & Sons. New Delhi,1996.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A 10x2=20 Marks Answer ALL Questions (Two questions from each unit)

Part-B 5x5=25 Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C 3x10=30 Marks Answer Any Three Questions (Three out of Five-one question from each unit)


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Semester: 4
Code : A4ACSP2
Medium: English and Tamil

Credits: 4
Hours/Week: 4

APPLIED PHYSICS-II (For students admitted from 2022-23)

OBJECTIVE

- To understand basics of Electronics, Laser and Optoelectronics.

UNIT I: SEMICONDUCTOR PHYSICS

Theory of energy bands in crystals -Distinguish between Conductors - Insulators and semiconductors - Hall Effect in semiconductors -Junction diode –Half wave rectifier – Zener diode - Zener diode as voltage regulators.

UNIT II: TRANSISTORS

PNP and NPN Transistors-Transistor Action- characteristics of transistor in CB and CE configuration - Transistors as an amplifier, Oscillator- FET - N channel and P channel FET -performance –Characteristics- FET Amplifier.

UNIT III: MASER AND LASER

Basic concepts of spontaneous and stimulated emission – Optical pumping - population inversion - Meta stable state - Maser – Ammonia maser. Lasers- Ruby laser and He - Ne laser – Applications of laser

UNIT IV: OPTO ELECTRONIC DEVICES

Photo electric effect - Laws of Photo electric effect - Photo electric cell - Photo voltaic cell - Applications - Light emitting diode - photo transistors - Electronic Watches - Seven segment display - LCD.

UNIT V: OPERATIONAL AMPLIFIERS AND INTEGRATED CIRCUITS

The Basic Operational amplifier - Inverting and Non inverting Operational amplifier - Differential Operational amplifier - CMRR- Basic uses of Operational amplifier - Adder - Subtractor -Differentiator – Integrator – Comparator.

Integrated circuit – Classification – Fabrication of basic monolithic IC.

OUTCOMES

By the end of the course, the student will be able to

- Get the knowledge of basic electronics, opto electronics and operational amplifiers.
- Understand the concepts of Maser and Laser.

BOOKS FOR STUDY

1. Applied Physics - Paper II- A.Sundaravelusamy -Priya Publications Karur 2012
2. Basic Electronics (solid state) - B.L. Theraja, S.Chand (2007)
3. Principles of Electronics – V.K.Mehta, Rohit Mehta, S.Chand & Co New Delhi (2013)
4. Microelectronics –Jacob Millman –McGraw-Hill.

BOOKS FOR REFERENCE

1. Functional Electronics – Ramanan –TMH, 1994.
2. The fundamentals of Solid state physics – Theraja Sultan Chand & Co., Delhi.

Question Paper Pattern

Maximum Marks: 75 Marks

Exam Duration: 3 Hrs

Part-A $10 \times 2 = 20$ Marks Answer ALL Questions (Two questions from each unit)

Part-B $5 \times 5 = 25$ Marks Answer ALL Questions (Either or Type-Two questions from each unit)

Part-C $3 \times 10 = 30$ Marks Answer Any Three Questions (Three out of Five-one question from each unit)

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Semester: 4
Code : A4ACSP

Credits: 4
Hours/Week: 3
Medium: English and Tamil

APPLIED PHYSICS PRACTICALS

(For students admitted from 2022-23)

OBJECTIVES

- To develop observation and computation skills.
- To develop skills in handling instruments.
- To get practical knowledge on various general and electricity experiments in physics

(Minimum Fourteen experiments)

1. Carey Foster's Bridge – Resistance and specific resistance.
2. Potentiometer – Resistance and specific resistance.
3. Potentiometer – calibration of ammeter.
4. Potentiometer – Calibration of low range voltmeter
5. Potentiometer – Calibration of high range voltmeter.
6. Field along the axis of the coil-determination of magnetic flux using deflection Magnetometer.
7. Moment of a magnet using a coil carrying current.
8. LCR - Series resonant circuit – Self inductance and quality factor of a coil.
9. LCR – Parallel resonant circuit – Self inductance and quality factor of a coil.
10. Characteristic of a Junction diode.
11. Characteristics of Zener diode.
12. Static characteristic of transistor – common base configuration.
13. Characteristics of FET.
14. Half wave rectifier.
15. Zener controlled voltage regulator.
16. AND, OR, NOT, gates using discrete components
17. Basic logic gates using IC's.
18. Operational Amplifier – Adder, Subtractor.

OUTCOMES

By the end of the course, the student will be able to

- Verify the theoretical concepts in physics through experiments.
- Understand the behavior of thermal properties of materials.
- Understand the validity of basic laws and theories to determine various properties of materials.

Maximum Marks-60

Exam Duration: 3 Hours

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