THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. PHYSICS
DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Mechanics	25	75	100
	III	Core Practical	Practical-1	4	-		-	-	-
4.	III	Allied -1	Paper-1	4	3	Chemistry I or Biochemistry I	25	75	100
	III	Allied Practical	Practical-1	2	0		0	0	0
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	4	4	Heat and Thermodynamics	25	75	100
10.	III	Core Practical	Practical-1	3	2	Practical - I	25	75	100
11.	III	Allied-1	Paper-2	4	3	Chemistry II or Biochemistry II	25	75	100
12.	III	Allied Practical	Practical-1	2	2	Practical-Allied	25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
16.	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	5	4	Electricity, Magnetism and Electromagnetism	25	75	100

	III	Core Practical	Paper-2	3	0		0	0	0
19.	III	Allied-2	Paper-3	6	3	Mathematics I	25	75	100
20.	IV	Skill Based Subject	Paper-1	2	2	Basic Electrical Technology	25	75	100
21.	IV	Non-Major Elective	Paper-1	2	2	Environmental Physics	25	75	100
		Sem. Total		**30**	**19**		**150**	**450**	**600**
SEMESTER IV									
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	5	5	Waves and Optics	25	75	100
25.	III	Core Practical	Practical-2	3	3	Any 15 Experiments given in the syllabus	25	75	100
26.	III	Allied-2	Paper-4	6	5	Mathematics II	25	75	100
27.	IV	Skill Based Subject	Paper-2	2	2	Physics Workshop Skills	25	75	100
28.	IV	Non-Major Elective	Paper-2	2	2	Everyday Physics	25	75	100
		Sem. Total		**30**	**25**		**175**	**525**	**700**
SEMESTER V									
29.	III	Core Theory	Paper-5	6	6	Atomic and Molecular Physics	25	75	100
30.	III	Core Theory	Paper-6	6	6	Relativity and Quantum mechanics	25	75	100
31.	III	Core Theory	Paper-7	6	6	Basic and Applied Electronics	25	75	100
	III	Core Practical	Practical-3	3	0	General Practical	0	0	0
	III	Core Practical	Practical-4	3	0	Electronics Practical	0	0	0
32.	III	Elective	Paper-1	4	3	Group (A) or (B) or (C)	25	75	100
33.	IV	Skill Based Subject	Paper-3	2	2	Cell Phone Technology	25	75	100
		Sem. Total		**30**	**23**		**125**	**375**	**500**
SEMESTER VI									
34.	III	Core Theory	Paper-8	5	4	Nuclear and Particle Physics	25	75	100
35.	III	Core Theory	Paper-9	4	4	Solid State Physics	25	75	100
36.	III	Core Practical	Practical-3	3	3	General Practical	25	75	100
37.	III	Core Practical	Practical-4	3	3	Electronics Practical	25	75	100
38.	III	Elective	Paper-2	4	3	Group (A) or (B) or (C)	25	75	100
39.	III	Elective	Paper-3	4	3	Group (A) or (B) or (C)	25	75	100
40.	III	Compulsory Project	Paper -10	5	5	Group / Individual Project	25	75	100
41.	IV	Skill based Subject	Paper-4	2	2	Weather forecasting	25	75	100
42.	V	Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**28**		**300**	**600**	**900**
		Grand Total			**140**				**4200**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English& English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	1	2		100	100
	Electives	3	3	9	100	300
	Core	9	(3-5)	43	100	900
	Core practical	4	(2-3)	11	100	400
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**43**		**140**		**4200**

Note: Compulsory Project

The faculty/Guides are advised to give projects and suggest project titles focusing more on the current field of research/social relevance and ensure the level of innovation. Staff member cannot guide more than five studentsfor a group project.

A student may be permitted to work on projects in an Industrial/Research Organization, on the recommendations of the Head of his/her Department. In such cases, the Project work shall be jointly guided by a guide of the department and an expert from the organization. The student shall be instructed to meet the respective guide periodically for evaluating the progress.

ELECTIVE SUBJECTS

Students can choose any one of the groups (Elective I, II & III)

GROUP A

Elective 1: Digital Electronics

Elective 2: Fundamentals of Microprocessor-8085

Elective 3: Nanophysics

GROUP B

Elective 1: Digital Electronics

Elective 2: Materials Science

Elective 3: Medical Physics

GROUP C

Elective 1: Digital Electronics

Elective 2: Radiation Safety

Elective 3: Astrophysics

SEMESTER III

CORE PAPER-3

Electricity, Magnetism & Electromagnetism

Course Objectives

1. Familiarize with the concept of electric flux, electric potential and capacitors.
2. To know the principles current and thermo electricity.
3. Understand the magnetic effects of electric current.
4. Study the unification of electric and magnetic phenomena.
5. To gain knowledge about Maxwell's equations.

UNIT- I

ELECTROSTATICS

Coulomb's Law- Gauss's Law and its applications (Electric Field due to a uniformly charged sphere, hollow cylinder & solid cylinder)-Electric Potential - Potential at a point due to a uniformly charged conducting sphere-Principle of a capacitor-Capacity of a spherical and cylindrical capacitors- Capacitance of a parallel plate capacitor-Partially filled with dielectric-Energy stored in a charged capacitor-Loss of energy on sharing of charges between two capacitors-Problems solving.

UNIT - II

CURRENT ELECTRICITY AND THERMO ELECTRICITY

Carey Foster's Bridge-Determination of temperature coefficient of resistance of a coil– Potentiometer-Calibration of Ammeter and Voltmeter (Low range and High range) - Comparison of Resistances- Seebeck, Peltier and Thomson effects -Peltier coefficient - Thomson coefficient - application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients - thermo electric power and thermo electric diagrams-Problems solving.

UNIT- III

ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction- Self and mutual induction- Self-inductance ofa solenoid-Mutual inductance of a pair of solenoids-Coefficient of coupling-Experimental determination of self (Rayleigh's method) and mutual inductance-Growth and decay of current in a circuit containing L and R-Growth and decay ofcharge in a circuit containing C and R-Measurement of High resistance byleakage-Problems solving.

UNIT- IV

MAGNETISM

Intensity of Magnetization-Magnetic Susceptibility- Magnetic Permeability-Types of magnetic materials- Properties of para, dia and ferromagnetic materials-Langevin's theory of dia and para magnetism-Weiss's theory of ferromagnetism - B-H curve-Energy loss due to magnetic hysteresis- Ballistic Galvanometermethod for plotting B-H curve - Magnetic properties of iron and steel-Problems solving.

UNIT- V

MAXWELL'S EQUATIONS &EMT

Introduction-Displacement Current-Maxwell's equations in material media-Plane electromagnetic waves in free space-velocity of light-Electromagnetic waves in isotropic non-conducting media-Index or refraction-Poynting vector-Problems solving

Text Books

Unit 1 to Unit 4

1. R Murugeshan- Electricity and magnetism, S Chand & Co., New Delhi, 2006.

Unit 4 and Unit 5

1. R Murugeshan- Electricity and magnetism, S Chand & Co., New Delhi, 2006
2. K KTewari, Electricity & Magnetism by, S Chand & Co.,2001.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalay Publishing House,Bombay, 1992.
3. M Narayanamurthy& N Nagarathnam, Electricity & Magnetism, National Publishing Co., Meerut.
4. David J Griffiths, Introduction to Electrodynamics, Prentice Hall of India, Pvt. Ltd., New Delhi, 1997.

E-Materials

1. https://en.wikipedia.org/wiki/Coulomb%27s_law
2. https://www.toppr.com/guides/physics/electric-charges-and-fields/coulombs-law/
3. https://www.youtube.com/watch?v=rkntp3_cZl4
4. https://ask.learncbse.in/t/derive-an-expression-for-the-capacitance-of-a-parallel-plate-capacitor/66928

5. http://egyankosh.ac.in/bitstream/123456789/18820/1/Experiment-6.pdf
6. https://www.youtube.com/watch?v=vGpXTq-ITCE
7. https://en.wikipedia.org/wiki/Thermoelectric_effect
8. https://ww.topperlearning.com/answer/derive-the-formula-for-self-inductance-of-a-solenoid/8k8rlhzff
9. https://www.brainkart.com/article/Self-inductance-of-a-long-solenoid_12109/
10. https://byjus.com/physics/diamagnetic-paramagnetic-ferromagnetic/
11. https://www.youtube.com/watch?v=yWa_2P6CDpw
12. https://nptel.ac.in/courses/115/101/115101005/
13. https://www.youtube.com/watch?v=4vEeG-YmCJQ (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to know fundamentals coulomb's law and Gauss's law and also able to derive the expression for electric potential, capacitance of a parallel plate capacitor.
2. After studied unit-2, the student will be able to derive the expression for temperature coefficient resistance of a coil using Carey Foster's Bridge and able to know how to calibrate the ammeter and voltmeter. Also able to learn the thermo electricity concept.
3. After studied unit-3, the student will be able to explain the concepts of self and mutual inductance using electromagnetic induction phenomenon.
4. After studied unit-4, the student will be able to distinguish the dia, para and ferro magnetic materials based on different theories.
5. After studied unit-5, the student will be able formulate the expression for displacement current and Maxwell's equations.

ALLIED - 2

Paper -3

MATHEMATICS - I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ.

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.

3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai

4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.

5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILL BASED SUBJECT
PAPER-1
Basic Electrical Technology

Course Objectives

1. Students can know the basic principles of electricity.
2. To expose the knowledge on different kinds of cells and batteries.
3. To state the different theorems for DC circuits and know the function of DC generator/motor.
4. To acquire the basic ideas of alternating voltage and current.
5. To know the principle of transformers and motors.

UNIT- I

BASIC ELECTRICITY PRINCIPLES

Voltage, Current, Resistance, and Power-Ohm's law- Resistors Series, parallel - combinations - Series-Parallel combinations - Charge-Coulomb's law-Capacitors-Capacitance of capacitor–ACElectricity-LT/HT Line-Concept of neutral and earth-Application of fuse- MCB, ELCB- relays -Electrical Safety- Safety Precautions of Electricity -Electric Shock-Preventive measures of Electrical Shock.

UNIT- II

CELL AND BATTERIES

Dry Cell -Voltaic Cell-Daniel cell-Lechlanche cell-Secondary Cell and its Classification-Lithium Ion Battery- Disparity between Lead Acid Battery and Lithium Ion Battery-Hydrogen battery-UPS Battery -Solar cell-Principle and design.

UNIT- III

DC CIRCUITS

Kirchhoff's Current and Voltage Law-Wheatstone's bridge-Source conversion-Superposition theorem-Thevenin's theorem-Norton's theorem-Joule's law of electric heating-Electric power-D.C generator-Construction and working-D.C motor-Speed of a D.C motor.

UNIT - IV

AC FUNDAMENTALS

Generation of Alternating voltages and alternating currents-Equations of the alternating voltages and currents-Simple waveforms - Cycle-Time Period - Frequency-Amplitude-Different forms of emf equation - Phase-Phase difference-RMS, Average and Peak values-RLC circuit in series-Resonance in RLC circuit-Graphic representation of series resonance-Single phase and three phase connections-Star and delta connection.

UNIT- V

TRANSFORMERS & MOTORS

Transformer-Step and Step down transformers-Construction and working-Losses in a transformer-Efficiency of a transformer-Types of a transformers-AC generator/alternator-Principle and construction-Single phase and three phase induction motors-Principle and construction

Text Books

Unit-1 to Unit-5

1. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, S. Chand & Company Ltd., New Delhi,2008.

2. B.L. Theraja and A.K. Theraja, A Text book of Electrical Technology, Volume I & II, Chand & Company Ltd., New Delhi, 2007.

Reference Books

1. V.K. Mehta and Rohit Mehta, Basic Electrical Engineering,S. Chand & Company Ltd., New Delhi, 2009.
2. Basic Electrical Engineering-Vocational Theory-Plus One Text Book-TN State Board.

E-Materials

1. https://www.electrical4u.com/
2. https://www.youtube.com/watch?v=WtymNvcBdIU
3. https://www.atlantictraining.com/blog/15-safety-precautions-electricity/
4. https://www.explainthatstuff.com/solarcells.html
5. https://www.youtube.com/watch?v=L_q6LRgKpTw
6. https://www.youtube.com/watch?v=3rOvQ3qFZpI
7. https://en.wikipedia.org/wiki/Wheatstone_bridge
8. https://www.electronics-tutorials.ws/accircuits/series-resonance.html
9. https://www.youtube.com/watch?v=smXF1UeN0EI (Tamil video)
10. https://www.youtube.com/watch?v=hXLA5sdT9Cs
11. http://www.circuitstoday.com/transformer

Course Outcomes

1. After studied unit-1, the student will be able to know principle of Voltage, Current, Resistance, Ohm's law and Electrical safety.
2. After studied unit-2, the student will be able to distinguish between cells and batteries and able to explain the different types of batteries.

3. After studied unit-3, the student will be able to understand the Wheastone's bridge, Thevenin and Norton's theorem and also able to describe the function of DC generator and motor.
4. After studied unit-4, the student will be able to know the fundamentals of alternating currents and voltages and able to differentiate the single phase and three phase connections.
5. After studied unit-5, the student will be able to acquire the principle and construction of transformers and its types and also able to demonstrate the function of AC generator.

NON-MAJOR ELECTIVE

PAPER-1

Environmental Physics

Course Objectives

1. Students will have the basic knowledge about atmosphere, weather and cyclones.
2. To understand the reasons for climate change and global warming.
3. To analyse the need and usage of non-conventional energy resources.
4. To learn the concepts of Radiation detection.
5. To realise the importance of Radiation safety measures.

UNIT- I

ATMOSPHERIC PHYSICS

Basics of the structure and composition of atmosphere - Layers of atmosphere - Measurement of atmospheric pressure and temperature - Weather patterns - Weather analysis and forecasting - Characteristics of cyclones and anti-cyclones.

UNIT- II

CLIMATE CHANGE

Climate - Definition and classification - Basic reasons for climate change - Greenhouse effect and gases -Effects of global warming - Ozone depletion - Acid rain.

UNIT- III

ENERGY RESOURCES

Need for non-conventional energy resources- Solar water heater - Solar cell -Merits and Demerits of Solar energy - Wind energy conversion systems - Bio mass energy - Bio gas generation - Industrial applications.

UNIT- IV

RADIATION DETECTION

Nuclear reactions - Nuclear fission and fusion - Interaction between energetic particles and matter - Ionisation Chamber - Proportional counter - Geiger Muller Counter - Wilson cloud chamber - Diffusion cloud chamber - Bubble chamber - Nuclear emulsions - Scintillation counter - Cerenkov counter.

UNIT- V

RADIATION SAFETY

Biological effects of nuclear radiations - Radiation hazards - Radiation protection standards - Radiation protection methods -Nuclear waste disposal management - Nuclear disasters - Chernobyl disaster - Hiroshima and Nagasaki disaster - Nuclear reactors in India - Radiation safety measures in India.

Text Books

Unit 1 and Unit 2

1. Frederick Lutgens K, Edward J Tarbuck, Dennis Tasa,Atmosphere- An Introduction to Meteorology, Prentice Hall of India.
2. S.R.Ghadekar, Meteorology, ,Agromet Publishers, 2001.
3. AnupChatterjee,Global Warming and Climate Change, , Global publications.

Unit 3

1. B.H.Khan, Non-Conventional Energy Resources, , McGraw Hill Publications.
2. Agarwal, Renewable and Sustainable Energy Sources,

Unit 4 and Unit 5

1. R.Murugesan, Modern Physics, , KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2007
2. S.N.Ghoshal, Nuclear Physics,S.Chand& Co, New Delhi, 2006
3. AN.Subrahmaniyam, Brijlal, Atomic and Nuclear Physics, S.Chand&Co, New Delhi, 2006
4. K.Gopalakrishnan, Atomic and Nuclear Physic, Mcmillan Publishers, 2006

Reference Books

1. I.C.Joshi, Aviation Meteorology, , Himalayan Books, 201.4
2. V.Devanathan, Nuclear Physics, ,Narosa Publishing House, New Delhi, 2013.
3. D.P. Kothari,K.C. Singal&RakeshRanjan, Renewable Energy Sources and Emerging Technologies, Prentice Hall of India pvt. Ltd., New Delhi, 2008.
4. A.Martin and S.A.Harbisor, An Introduction to Radiation Protection, , John Wiley & Sons, 1981.
5. Atmospheric Science - An Introductory Survey , John M.Wallace, Peter V.Hobbs, Elsevier Publishers
6. NCRP, ICRP, ICRU, IAEA, AERB publications

E-Materials

1. https://easyengineering.net/non-conventional-energy-resources-khan/
2. http://nap.edu/631
3. https://ocw.mit.edu/courses/nuclear-engineering/22-091-nuclear-reactor-safety-spring-2008/

4. https://en.wikipedia.org/wiki/Atmosphere_of_Earth
5. https://www.youtube.com/watch?v=zaQWhEtLxeU (Tamil video)
6. https://www.youtube.com/watch?v=Nf8cuvl62Vc
7. https://en.wikipedia.org/wiki/Acid_rain
8. https://nptel.ac.in/content/storage2/courses/108108078/pdf/chap7/teach_slides07.pdf
9. https://www.youtube.com/watch?v=Rf9whdycpLI
10. https://www.youtube.com/watch?v=WyyIuiV4rKE
11. https://en.wikipedia.org/wiki/Geiger_counter

Course Outcomes

1. After studied unit-1, the student will be able to basic concepts of atmosphere and also able to know how it can be measured and study the characteristics of cyclones.
2. After studied unit-2, the student will be able to explain the details of climate, greenhouse effect and global warming.
3. After studied unit-3, the student will be able to describe the different renewable energy sources and its applications.
4. After studied unit-4, the student will be able to know how to detect the nuclear radiation with different instruments.
5. After studied unit-5, the student will be able to know how to saveourselves from nuclear radiation hazards.

SEMESTER IV

CORE PAPER-4

Waves and Optics

Course Objectives

1. To expose the knowledge of different types of waves motion and oscillations.
2. To study the property of surface tension and viscosity of a liquid.
3. To learn the different types of aberrations and phenomenon of interference.
4. To teach the Fresnel's and Fraunhofer's class diffraction and its applications.
5. To know the basics of polarization phenomenon.

UNIT- I

WAVES & OSCILLATIONS

Progressive waves-Equation for progressive wave-Simple harmonic motion - Superposition of Two Perpendicular Harmonic Oscillations - Lissajous Figures -Forced oscillations-Differential equation and solution-Laws of transverse vibration of stretched string - Sonometer-Frequency of AC mains - Acoustics-Intensity and Loudness-Reverberation and reverberation time - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria -Ultrasonics-Production-Piezoelectric oscillator - Applications-Non Destructive Testing (NDT)-B-Scan-Problems solving

UNIT- II

FLUIDS

Surface Tension-Excess pressure inside a curved liquid surface-Synclastic and anticlastic surface - Surface tension-Jaeger's method-Drop weight method-Interfacial surface tension-Variation of surface tension with temperature - Viscosity-Poiseuille's formula - Determination of coefficient of viscosity of aliquid -Burette method- Variations of viscosity of a liquid with temperature and pressure - Lubrication-Problems solving

UNIT- III

GEOMETRICAL OPTICS & INTERFERENCE

Spherical aberration in lenses -Condition for minimum spherical aberration in the case of two lenses separated by a distance-Chromatic aberration in lenses - Condition for achromatism of two thin lenses(in contact and out of contact) - Astigmatism-Huygen's and Ramsden's eyepieces - Air wedge- Determination of diameter of a thin wire by air wedge-Fringes of equal thickness-Michelson's Interferometer-Determination of wave length-Thickness of thin transparent material-Refractive index of gases -Jamin's& Rayleigh's Interferometers-Problems solving

UNIT- IV

DIFFRACTION

Fresnel's diffraction-Diffraction at circular aperture and straight edge- Fraunhofer's diffraction -Single slit-Theory of Plane diffraction grating -Experiment to determine wavelength-normal incidence- Determination of wavelengths-Missing orders-Overlapping spectra-Rayleigh's criteria -Resolving power of telescope-Microscope-Prism - Grating-Distinguish between prism and grating spectra-Problems solving

UNIT- V

POLARISATION

Introduction to polarisation-Brewster's law- Double refraction-Huygen's explanation of double refraction in uniaxial crystal-Nicol Prism-Double image polarizing prisms-Dichroism -Polaroids and their uses-Production and detection of Plane, circularly and elliptically and polarized light -Optical Activity -Fresnel's explanation of optical activity -Specific Rotation-Laurent's Half Shade Polarimeter -Faraday effect-Problems solving

Text Books

Unit 1 to Unit 2

1. K. Ilangovan, Properties of Matter and Sound, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2018.
2. J.Jayachitra and M. Gunasekaran, Properties of Matter and Acoustics, KRU Publications, Kumbakonam, 2007.

Unit 3 to Unit 5

1. N.SubrahmanyamBrijlal and M.N Avadhanulu, A Text Book of Optics, S.Chand& Co.Ltd, New Delhi, 2015.
2. R. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

Reference Books

1. R. Murugeshan, Properties of Matter and Acoustics, S.Chand&Co.Ltd, New Delhi, 2016
2. BrijLal and N. Subrahmanyam, Properties of Matter, S.Chand&Co.Ltd, New Delhi, 2002
3. N.Subrahmanyam and BrijLal, A Text Book of Sound,Vikas Publications, New Delhi,1982.
4. C.L.Arora, Waves, Vibrations & Sound, S.Chand&Co.Ltd, New Delhi, 1984.
5. B.K. Mathur, Principles of Optics, Gopal Printing, 1995
6. H.R. Gulati and D.R. Khanna,Fundamentals of Optics, R. Chand Publication, 2011.

E-Materials

1. http://hyperphysics.phy-astr.gsu.edu/hbase/shm.html
2. https://www.youtube.com/watch?v=tudxily5Qu0
3. https://en.wikipedia.org/wiki/Surface_tension
4. https://www.youtube.com/watch?v=CC7Q5cvmuTA (Tamil video)
5. https://www.youtube.com/watch?v=aKY_GnwDyZc
6. https://ta.wikipedia.org/wiki/%E0%AE%AA%E0%AE%9F%E0%AE%BF%E0%AE%AE%E0%AE%AE%E0%AF%8D:Chromatic_aberration_lens_diagram.svg (Tamil)
7. https://www.diffen.com/difference/Fraunhofer_Diffraction_vs_Fresnel_Diffraction
8. https://www.youtube.com/watch?v=Q-oQKSLhLKw
9. https://www.slideshare.net/AnuroopAshok/polarization-birefringence-and-huygens-theory-of-double-refraction
10. https://www.youtube.com/watch?v=lhUUGWA_uFE

Course Outcomes

1. After studied unit-1, the student will be able to formulate the equation for plane progressive wave and able to understand the concept of simple harmonic motion and other types of waves
2. After studied unit-2, the student will be able study the property of surface tension of a liquid and know how the surface tension varies with temperature and also able to explain the property of viscosity of a liquid.
3. After studied unit-3, the student will be able to describe the different optical of a lens system and able to design the eyepieces. Also able to know the phenomenon of interference and its applications.
4. After studied unit-4, the student will be able to distinguish between Fresnel class of diffraction and Fraunhofer class of diffraction. Also formulate the expression for resolving power of telescope, microscope, prism and grating.
5. After studied unit-5, the student will be able to explain the phenomenon of polarization and able to study the double refraction in uniaxial crystals. Also they can define optical activity, specific rotation and know the applications of polaroids.

ALLIED - 2

Paper - 4

MATHEMATICS - II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Guass, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

SKILL BASED SUBJECT
PAPER-2
Physics Workshop Skills

Course Objectives

1. Employ the specific skills in the testing of instruments.
2. Express the functions and working of different power supply system
3. To know the principle and working of different electrical and electronics appliances
4. State the concept of mobile Communication in real time process and digital communication.
5. Explain the Identification, classification, and working principle of various Biomedical Instruments and application of these instruments in diagnosis, therapeutic treatment and imaging fields

UNIT- I

TESTING OF DISCRETE COMPONENTS

Resistors- types - Characteristics -Colour coding -resistors in series and parallel - Capacitors - types -Capacitor in Series and Parallel - Multimeter Analog and Digital - How to Use a Multimeter -Testing of Voltage - Current Continuity (Testing of Fuse) -Resistance -Diode and Transistor-Design of Bread board-Soldering Technique used in PCBs.

UNIT- II

POWER SUPPLY

Power Supply Unit-Parts of Power Supply- Regulated power supply- Zener diode voltage regulator- IC Voltage - Regulators - Inverter-Uninterrupted power supply (UPS) - Switched mode power supply (SMPS)-Cathode Ray Oscilloscope (CRO) and measurement of time period and frequency - Function generator.

UNIT- III

ELECTRICAL & ELECTRONICS APPLIANCES

Electric iron Box-Electric Fan-Construction and Working of Ceiling and Table fans-Water Heater - Types-Function -Wet Grinder-Mixer Grinder-Principle and Design

Microwave Oven-Washing Machine - Function - Types-Semi and Fully Automatic-Top and Front loading-Fuzzy logic washing machine technology – Refrigerator-Air Conditioner-Principle and Design.

UNIT- IV

MASS AND MEDIA COMMUNICATION

Mobile Communication (GSM) -Android version- USB - Various Types of USB Cable and Connectors - VGA- AV port - HDMI- DVI - S Video and Display port- Bluetooth - Wi-fi and Li-fi - Direct broadcast satellite (DBS)- DTH and DTT- Radar Communication System.

UNIT-5

BIO-MEDICAL INSTRUMENTATION

Principle, description, function and recording of ECG, EMG and EEG -artificial pace maker- simulators -Heart lung machine –ventilators and nebulizers-Kidney dialysis machine- pH meter - Laser blood flow meter–Thermal scanner and pulse oximeter.

Text Books

Unit-1

1. B.L. Theraja, A Text book of Electrical Technology, S.Chand& Co., New Delhi, 2007.

Unit-2

1. I.Abraham, Switching Power Supply Design, Keith Billings, Taylor Morey -McGraw Hill.
2. Fundamentals of Power Supply Design: Technology from the Unitrode/Texas Instruments.
3. Robert A. Mammano, Power Supply Design Seminars, , Texas Instruments, 2017.

Unit-3

1. S.P. Bali, Consumer Electronics -, Pearson Education, New Delhi, 2005.
2. Basic Electrical Engineering -Vocational Theory-Plus One Text Book-TN State Board.

Unit-4

1. V.K. Metha, Principles of Electronics, V K Metha, S Chnd&Co.,New Delhi, 2001.
2. V. JeyasriArokiasamy, Mobile Communications,Technical Publications, 2009.
3. John Vivianand Peter Maurin, The Media of Mass Communication,Pearson Education Canada, 2008.
4. R.R. Gulati, Modern Television Practice Principles, Technology & Servicing, New Age International, 2007.
5. K. F. Ibrahim, Newness Guide to Television and Video Technology, Elsevier, 2007.
6. Richard Wise and Routledge, Multimedia: A Critical Introduction, 2005.
7. V.S.Bagad, ,RadarSystem,Technical Publications, 2009.

Unit-5

1. M.Arumugam M, Biomedical Instrumention, Anuradha Publications, Kumbakonam, 2011.
2. V.Yuvaraj, Instrumentation Techniques, Sri Krishna Publications, 2020.
3. Webster, Bioinstrumentation, John Wiley & Sons, 2007.

Reference Items: books, Journal

1. I.J. Nagrath and D. P. Kothari, Electrical Machines,Tata McGraw Hill, 1997.
2. M. D. Singh, K. B.Khanchandani Power Electronics, Tata McGraw Hill, 2006.

E- Materials

1. https://www.electronicsforu.com/
2. https://learnabout-electronics.org/
3. https://www.scienceabc.com/innovation/usb-type-c-different-usb-type-type-b.html
4. https://www.electronics-tutorials.ws/supplies/power-supplies-for-beginners-part-1.html
4. https://electronicspost.com/basic-electronics-tutorials/
5. https://www.electrical4u.com/
6. https://lecturenotes.in/subject/199/analytical-instrumentation-ai
7. https://blog.beaconstac.com/2016/05/li-fi-vs-wi-fi-vs-ibeacon-ble-technology/
8. https://www.makeuseof.com/tag/video-cables-explained-difference-vga-dvi-hdmi-ports/
9. https://www.ses.com/differences-between-dth-and-dtt
10. https://www.ifixit.com/Guide/How+To+Use+A+Multimeter/25632#s64987
11. http://electrotel.com.ar/handbook-of-analytical-instruments-r-s-khandpur-download-full-version.pdf
12. https://sidneymayireg.files.wordpress.com/2017/04/
13. https://en.wikipedia.org/wiki/Electrocardiography
14. https://www.youtube.com/watch?v=YbBSf8bnYgw
15. https://www.youtube.com/watch?v=1ndqOnjxAU0 (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to test the instruments with specific skills
2. After studied unit-2, the student will be able to express the functions and working of Linear power supply.
3. After studied unit-3, the student will be able to know the basics of analytical instruments and how to calibrate it.
4. After studied unit-4, the student will be able to explain mobile communication and radar communication system.
5. After studied unit-5, the student will be able to demonstrate the principle and working of various biomedical equipment.

NON MAJOR ELECTIVE

PAPER-2

Everyday Physics

Course Objectives

1. Students can able to understand the basic measurements and mechanics.
2. To learn the principle applied in Pressure cooker, Refrigerator and Air-conditioner.
3. To know the construction and working of various electrical appliances.
4. To study the fundamentals of laser and its applications.
5. To know the different biomedical instrumentation techniques.

UNIT- I

MEASUREMENTS & MECHANICS

Fundamental quantities-System of Units-CGS,FPS,MKS and SI-Verniercalliper, Screw gauge and their utility-Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet-Newton's law of motion-Lever mechanism - Pulleys-Force -Weight -Work -Energy -Power- Horsepower -Circular motion-Banking of curved tracks.

UNIT-II

THERMO AND HYDRODYNAMICS

Variation of boiling point with pressure - Pressure cooker - First and Second law of thermodynamics-Refrigerator - Air Conditioner - Principle and construction-Bernoulli Theorem-Applications.

UNIT - III

ELECTRICAL APPLIANCES

Electric iron Box-Electric Fan-Construction and Working of Ceiling and Table fans-Water Heater -Types-Function -Wet Grinder-Mixer Grinder-Principle and Design.

UNIT- IV

LASER

Power of a Lens-Human eye- Defects of vision - Laser-Spontaneous emission -Stimulated emission -Meta stable state -Population inversion -Pumping - Laser Characteristics- Ruby Laser - Helium-Neon Laser-Applications of Laser-Laser cutting - Welding- Drilling - Lasers in Surgery - Lasers in ophthalmology.

UNIT- V

BIOMEDICAL INSTRUMENTATION

Digital thermometer-Digital BP apparatus-One touch Glucometer–thermal scanner-pulse oximeter-Lipid profile test-pH meter-BMI calculator - Ventilator-Principle, description, function and recording of ECG, EMG and EEG- artificial pace maker.

Text Books

Unit 1& Unit 2

1. N. Subrahmanyam and BrijLal, Principles of Physics, S.Chand&Co.,Ltd, Chennai.
2. Plus one Physics Book-TN state Board and NCERT Books.
3. D. Jayaraman, K. Ilangovan, Thermal Physics &Stastical Mechanics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2016.
4. BrijLal and N Subrahmanyam, Heat and Thermodynamics, S Chand & Company Pvt Ltd, New Delhi, 2016.

Unit 3

1. S.P. Bali,Consumer Electronics -, Pearson Education, New Delhi, 2005.
2. Basic Electrical Engineering -Vocational Theory- Plus One Text Book-TN State Board.

Unit 4

1. R. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

Unit 5

1. M.Arumugam M, Biomedical Instrumentation, Anuradha Publications, Kumbakonam, 2011.
2. V.Yuvaraj, Instrumentation Techniques, Sri Krishna Publications, 2020.

Reference Books

1. Fundamentals of Physics by D. Hallidy, R. Rensick and J. Walker, 6th Edition, Wiley, NY,2001.
2. BrijLal and N Subrahmanyam,Heat and Thermodynamics, S Chand & Company Pvt Ltd, New Delhi, 2016.
3. R. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

E-materials

1. https://www.youtube.com/watch?v=M_kHKSKmT6o
2. https://www.toppr.com/content/concept/fundamental-quantities-and-fundamental-units-208185/

3. https://www.youtube.com/watch?v=T-mRqCjv6ak (Tamil video)
4. https://www.jagranjosh.com/general-knowledge/the-human-eye-and-its-defects-1456386342-1
5. https://www.youtube.com/watch?v=c4_5ftlYTbI
6. https://en.wikipedia.org/wiki/Laser
7. https://www.youtube.com/watch?v=oUEbMjtWc-A
8. https://techblog.livongo.com/how-do-blood-pressure-monitors-work/
9. https://www.youtube.com/watch?v=7oKNewTSF7M
10. https://www.youtube.com/watch?v=-UJf-GHz7x4 (Tamil video)
11. https://www.smartbmicalculator.com/

Course Outcomes

1. After studied unit-1, the student will be able to know the fundamental quantities and units and able to some basic ideas of mechanics.
2. After studied unit-2, the student will be able to demonstrate the construction and working of pressure cooker, refrigerator, air conditioner devices.
3. After studied unit-3, the student will be fundamental principles applied in our day today life electrical appliances.
4. After studied unit-4, the student will be able to know the basic properties of laser and characteristics and able to design solid and gas lasers.
5. After studied unit-5, the student will be able to demonstrate the principle and working of biomedical equipment will be used in our daily life.

CORE PRACTICAL-2

Semester: III & IV

Core Practical -2

List of Experiments (Any 15 Experiments only)

1. Young's modulus non-uniform bending –optic lever.
2. Young's modulus uniform bending-Pin and microscope.
3. Searle's double bar pendulum- Determination of Young's modulus, Rigidity modulus and Poisson's ratio
4. Sonometer- Frequency of AC mains - Steel and Brass wires.
5. Spectometer -i-d curve-μ of a Prism.
6. Spectometer -Grating -N and λ -Normal incidence method.
7. Spectometer -Grating -N and λ -Minimum deviation method.
8. Air wedge - Thickness of a thin wire.
9. Carey Foster's bridge - Temperature coefficient of resistance of a coil
10. Potentiometer -Calibration of highrange Ammeter.
11. Potentiometer - Resistance and specific resistance of a wire.
12. Figure of merit- Table Galvanometer.
13. Field along the axis of a circular coil carrying current-Determination of B_H.
14. BG- Figure of merit - Charge sensitiveness.
15. BG- Comparison of capacitances of capacitors.
16. BG- Comparison of emf of two cells.
17. Deflection magnetometer and vibration magnetometer-Determination of m and B_H-Tan C position.
18. Low range power pack –Bridge Rectifier.
19. Voltage regulator -Bridge Rectifier-Using a Zener diode.
20. Voltage regulator -Bridge Rectifier-Using IC 7805.
21. Transistor characteristics-Common emitter mode.
22. Logic gates-AND, OR (using diodes) and NOT (using transistor).
23. NAND and NOR gates-Universal gates.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Samir Kumar Ghosh, A Textbook of Advanced Practical Physics, NCBA, Kolkatta, 2000.
2. D. Chattopadyay, P.C.Rakshit, An Advanced Course in Practical Physics, NCBA,

Kolkatta, 2011
3. C.L.Arora, B.Sc., Practical Physics,S. Chand and Company., New Delhi.
4. D.P..Khandelwal D.P., A Laboratory Manual of Physics for Undergraduate Classes. Vani Publications.
5. B.Saraf et al, Physics through Experiments,Vikas Publications.
6. Harnaam Singh., B.Sc., Practical Physics,S. Chand and Company., New Delhi.
7. D C Tayal, University Practical Physics, Himalaya Publishing House.
8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut.