DEPARTMENT OF PHYSICS

COURSE STRUCTURE & SYLLABI (For the students admitted from year 2023-2024 onwards)

Programme : B.Sc. Physics





JAMAL MOHAMED COLLEGE (AUTONOMOUS)

Accredited with A++ Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0 (Affiliated to Bharathidasan University) TIDUCHIDADDALLL 620.020

TIRUCHIRAPPALLI – 620 020

B.SC. PHYSICS

_				Ins.		Marks		m	
Sem	Course Code	Part	Course Category	Course Title	Hrs/	Credit	СІА	FSF	Total
-					Week			LDL	
	23U1LT1/LA1/	Ι	Language - I		6	3	25	75	100
	LF1/LH1/LU1						ļ		
	23UCN1LE1	II	English - I	English for Communication - I		3	25	75	100
т	23UPH1CC1		Core - I	Properties of Matter and Acoustics	5	5	25	75	100
•	23UPH1CC2P	ш	Core - II	Properties of Matter - Practical	3	3	20	80	100
	23UCH1AC1:1		Allied - I	Inorganic, organic and Physical Chemistry - I	5	4	25	75	100
	23UCH1AC2P		Allied - II	Volumetric Estimations - Practical	3	2	20	80	100
	23UCN1AE1	IV	AECC - I	Value Education	2	2	-	100	100
				Total	30	22	I		700
	23U2LT2/LA2/	т	I anguage - II		6	3	25	75	100
	LF2/LH2/LU2	1	Language - II		0	3	23	15	100
	23UCN2LE2	II	English - II	English for Communication - II	6	3	25	75	100
	23UPH2CC3		Core - III	Mechanics and Relativity	6	6	25	75	100
	23UPH2CC4P		Core - IV	Heat and Optics - Practical	3	3	20	80	100
п	23UCH2AC3:1	111	Allied - III	Inorganic, Organic and Physical Chemistry - II	4	4	25	75	100
	23UCH2AC4P		Allied - IV	Organic Analysis - Practical	3	2	20	80	100
	23UCN2SS	IV	Soft Skills Development	Soft Skills Development	2	2	20	100	100
	22UCN2CO	IV V	Community Outroach		2	@		100	@
	23UCN2CO	v	Posia Tamil I/	JAWCKOF	-		- <u>-</u>	-	
	23U2D11/		Advanced Termil I	எழுத்தும் இலக்கியமும் அறுமுகம் -1/ எலிக் வைச்சியமும் வாலாஸம் I	-	-	-	100#	-
	2302A11		Advanced Tanni - I	ഉല്ല് ജ്യംക്കെവന്ന ബാംബില്ല് -1	20				=00
	"Only grades w	ill be g	liven	Total	30	23	L		700
	23U3LT3/LA3/	Ι	Language - III		6	3	25	75	100
	LF3/LH3/LU3								100
	23UCN3LE3	п	English - III	English for Communication - III	6	3	25	75	100
	23UPH3CC5		Core - V	Heat, Thermodynamics and Statistical Mechanics	4	4	25	75	100
ш	23UPH3CC6P	ш	Core - VI	Thermal and Electricity - Practical	3	3	20	80	100
	23UMA3AC5:2		Allied - V	Calculus	4	3	25	75	100
	23UMA3AC6:2		Allied - VI	Algebra and Trigonometry	3	3	25	75	100
	23UPH3GE1		Generic Elective - I		2	2	-	100	100
	23UCN3AE2	IV	AFCC - II	Environmental Studies	2	2	-	100	100
	250011571112		Allee II	Environmental Studies	20	2		100	100 800
				1 otai	30	23		1	800
	23U4L14/LA4/	Ι	Language - IV		6	3	25	75	100
	LF4/LH4/LU4	TT		En lich for Communication W	6	2	25	75	100
	25UCIN4LE4	п			0	5	23	73	100
	23UPH4CC7		Core - VII	Optics and Spectroscopy	5	5	25	/5	100
	23UPH4CC8P	Ш	Core - VIII	Measurement and Calibration - Practical	3	3	20	80	100
IV	23UMA4AC7:2		Allied - VII	Differential Equations	4	3	25	75	100
	23UMA4AC8:2		Allied - VIII	Vector Calculus and Fourier series	4	3	25	75	100
	23UPH4GE2	IV	Generic Elective - II		2	2	-	100	100
	23UCN4EL		Experiential Learning	Internship / Industrial Visit	-	2	-	100	100
	23UCN4EA	V	Extension Activities	NSS, NCC, etc.	-	1	-	-	-
	23U4BT2/		Basic Tamil - II/	எழுத்தும் இலக்கியமும் அறிமுகம் -II/	-	-	-	100#	-
	23U4A12		Advanced Tamil - II	தமிழ இலக்கியமும் வரலாறும் -11	20	25	├───		000
				10tal	30	25		1	800
	23UPH5CC9P1		a	Advanced Optics Experiments and Python	3	3	10	40	50
	2211011500002		Core - IX	Anala Electronica and Missenna Description	2	2	10	40	50
	2307130092			Analog Electronics and Microprocessor - Practical	3	3	10	40	50
	23UPH5CC10	III	Core - X	Electricity, Magnetism and Electromagnetism	5	5	25	75	100
v	23UPH5CC11		Core - XI	Atomic Physics	5	5	25	75	100
'	23UPH5CC12		Core - XII	Nuclear Physics	5	5	25	75	100
	23UPH5DE1A/B		Discipline Specific Electives- I		5	4	25	75	100
	23UPH5SE1	w	Skill Enhancement Course -I	Scientific Programming in Python	2	1	-	100	100
	23UPH5SE2	1 V	Skill Enhancement Course -II	Electrical and Electronic Instrumentation	2	1	-	100	100
	23UPH5EC1		Extra Credit Course - I*	Online Course	-	*		-	-
				Total	30	27			700
	23UPH6CC13D1			General Experiments and Python Programming -	3	3	10	40	50
	25011100001511		Core - XIII	Practical	5	3	10	40	50
	23UPH6CC13P2			Digital Electronics and Microprocessor - Practical	3	3	10	40	50
	23UPH6CC14		Core - XIV	Wave Mechanics	6	6	25	75	100
	23UPH6CC15	III	Core - XV	Laser and Medical Physics	5	5	25	75	100
	23UPH6PW		Project Work	Project Work	3	2		100	100
VI	23UPH6DE2A/B		Discipline Specific Electives-II		5		25	75	100
	23UPH6DE3A/B		Discipline Specific Electives III		3	4	25	75	100
	23UFH0DESA/B	IV.	AECC III	Conder Studios	4	4		100	100
	23UCN0AE3	1V	AECC - III		1	1		100	100
	23UPH6EC2		Extra Credit Course - II*	Online Course	-	۳ 44	-	-	-
	23UPHECA		Extra Credit Course for all**		-	** +	-	-	-
	23UCN6ECA1		Extra Credit Course for all ⁺	Entrepreneurship Development	-	Ŧ	-	-	-
	Programme Spe	cific O	nine Course for Advanced Learne	rs (1)	20	20			700
	+ Course for Er-b	urse IO	Entroproportial Skills	1 otal	30	20			700
	Course for Enn	ancing	End epi encuriai Skills		I	┝──┤			
				Gran	d Total	148			4400

GENERIC ELECTIVE COURSES

Semester	Course Code	Course Title			
III	23UPH3GE1	Astronomical Science			
IV	23UPH4GE2	Medical Physics			

[#]Self-Study Course – Basic and Advanced Tamil

(Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

Semester	Course Code	Course Title
п	23U2BT1	Basic Tamil – I (எழுத்தும் இலக்கியமும் அறிமுகம் - I)
11	23U2AT1	Advanced Tamil – I (தமிழ் இலக்கியமும் வரலாறும் - I)
IV.	23U4BT2	Basic Tamil – II (எழுத்தும் இலக்கியமும் அறிமுகம் - II)
1V	23U4AT2	Advanced Tamil – II (தமிழ் இலக்கியமும் வரலாறும் - II)

Mandatory

Basic Tamil Course - I and II are offered for the students who have not studied Tamil Language in their schools and college.

Advanced Tamil Course - I and II are offered for those who have studied Tamil Language in their schools but have opted for other languages under Part - I.

Semester	Course Code	Course Title			
V	23UPH5DE1A	Semiconductor Devices and Circuits			
v	23UPH5DE1B	Fundamentals of Nanoscience			
	23UPH6DE2A	Digital Electronics and Microprocessor			
VI	23UPH6DE2B	Materials Science			
V1	23UPH6DE3A	Non Conventional Energy Physics			
	23UPH6DE3B	Astrophysics			

DISCIPLINE SPECIFIC ELECTIVES

ALLIED COURSE STRUCTURE FOR CHEMISTRY & MATHEMATICS

G		G		Ins.	C I'	Ma	Total	
Sem	Course Code	Course Category	Course Inte	Hrs/ Week	Credit	CIA	ESE	Total
I	23UPH1AC1	Allied - I	Fundamentals of Physics	5	4	25	75	100
	23UPH1AC2P	Allied - II	Properties of Matter - Practical	3	2	20	80	100
п	23UPH2AC3	Allied - III	Essentials of Physics	4	4	25	75	100
11	23UPH2AC4P	Allied - IV	Optical, Thermal and Electricity - Practical	3	2	20	80	100

ALLIED COURSE STRUCTURE FOR COMPUTER SCIENCE

			Ins.		Ma			
Sem	Course Code	Course Category	Course Title	Hrs/ Week	Credit	CIA	ESE	Total
ш	23UPH3AC5	Allied - V	Electronic Circuits and Devices	4	4	25	75	100
	23UPH3AC6P	Allied - VI	Electronics - Practical	3	2	20	80	100
TV.	23UPH4AC7	Allied - VII	Digital Electronics and Microprocessor	5	4	25	75	100
11	23UPH4AC8P	Allied - VIII	Digital and Microprocessor - Practical	3	2	20	80	100

ALLIED COURSE STRUCTURE FOR ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

~	~ ~ .	~ ~			~	Marks		T 1	
Sem	Course Code	Course Category	Course Title	Week	Credit	CIA	ESE	Total	
ш	24UPH3AC5	Allied - V	Electronic Circuits and Devices	4	4	25	75	100	
111	24UPH3AC6P	Allied - VI	Electronics - Practical	3	2	20	80	100	
W	24UPH4AC7	Allied - VII	Digital Electronics and Microprocessor	5	4	25	75	100	
1 V	24UPH4AC8P	Allied - VIII	Digital and Microprocessor - Practical	3	2	20	80	100	

Somester	Course Code	urse Code Course Cotogory		Hours/ Credits		Marks for Evaluation				
Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total			
Ι	23UPH1CC1	Core - I	5	5	25	75	100			

itle PROPERTIES OF MATTER AND ACOUSTICS

	SYLLABUS	
Unit	Contents	Hours
I	Elasticity : Types of elasticity – Relation between Elastic moduli– Poisson's ratio – relation between Poisson's ratio and Elastic moduli – Experimental determination of Poisson's ratio of rubber - Expression for torque per unit twist -*Bending moment of a beam* – Cantilever –Determination of Young's Modulus by Cantilever depression	15
п	Viscosity and Surface Tension: Viscosity: Coefficient of viscosity – streamline and turbulent flow - Poiseuille's equation for the coefficient of viscosity - corrections in the Poiseuille's equation – Determination of Viscosity of the Liquids: Stokes's Method – Oswald Viscometer Surface tension: pressure difference across a spherical surface – *excess pressure inside a curved surface* – Jaeger's experiment to determine the surface tension of a liquid	15
III	 Diffusion and Osmosis: Diffusion : Diffusion in liquids – Graham's laws of diffusion for liquids – Fick's law of diffusion – *Analogy between liquid diffusion and heat conduction*– Experimental determination of coefficient of diffusion Osmosis: Osmosis and Osmotic pressure – Laws of Osmotic pressure – Experimental determination of osmotic pressure (Berkeley and Hartley method) – –elevation of the boiling point – depression of freezing point 	15
IV	Acoustics: Origin of sound - velocity of longitudinal waves in gases – Newton's formula for velocity of sound in air - effect of temperature - pressure – density of the medium, humidity, wind – velocity of sound in water (experiment) — wave velocity and molecular velocity – *Doppler effect* – Tracking of Artificial Satellites - Applications of Doppler effect	15
V *	Acoustics of Buildings & Ultrasonics: Acoustics – Reverberation – Reverberation time - Sabine's reverberation formula — Factors affecting the acoustics of the buildings- Conditions for good acoustics – Ultrasonics- Properties- *Production of ultrasonic waves*– Piezo electric oscillator – Detection of ultrasonic waves - Applications of ultrasonic waves * Self Study	15

Text Book(s):

1. R. Murugeshan, Properties of Matter, Fifth Edition, S. Chand & Co Pvt. Ltd., New Delhi. 1994, Reprint 2010.

Unit – I: Section 1.1-1.2, 1.7 - 1.8, 1.9, 1.13, 1.14, 1.15, 1.19, 1.20

Unit – II: Section 2.1-2.4, 2.13, 3.1, 3.2, 3.8, 3.9, 3.11

Unit – III: Section 3.1 – 3.4, 3.6, 3.8 – 3.9, 3.11, 3.12

2. N.Subrahmanyam &Brijlal, Waves and Oscillations, Vikas Publishing House Pvt. Ltd., Second Revised Edition, 1994.

Unit – IV: Section 5.1, 5.3-5.10, 5.13, 9.1, 9.5, 9.7

Unit – V: Section 11.14 – 11.16, 11.20 – 11.24, 11.27

Reference Book(s):

BrijLal & Subramaniam, Properties of Matter, S.Chand Publications, 4th edition, 2008.
 MathurD.S, Elements of Properties of Matter, Eleventh edition, Shyamlal Charitable Trust, New Delhi, 1993.

Web Resource(s):

1. https://www.physicsclassroom.com/class

2. https://www.askiitians.com/revision-notes/physics/

3. https://www.classcentral.com/course/swayam-fundamentals-of-acoustics-7927

	Course Outcomes								
Upon suc	Upon successful completion of this course, the student will be able to:								
CO No.	CO Statement	Cognitive Level (K-Level)							
CO1	understand the elastic properties and bending behaviour of beams	K2							
CO2	enhance the knowledge by learning the properties of matter	K3							
CO3	stimulate to think the applications of matter with different physical properties	К3							
CO4	CO4estimate velocity of sound in different media, analyze viscosity, surface tension, diffusion and osmosis of given liquidsK4								
CO5	determine different physical constants of matter, estimate velocity of sound in different media	К5							

Relationship Matrix:

Course	se Programme Outcomes (POs)					Progra	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	2	3	3	2	2	3	3	3	2	2	2.5
CO2	3	3	3	2	2	3	2	1	1	2	2.2
CO3	3	3	3	1	3	2	2	2	2	3	2.4
CO4	3	3	2	3	2	3	3	3	1	3	2.6
CO5	2	3	2	2	2	2	3	3	2	2	2.3
								Me	an Overa	all Score	2.40
									Cor	relation	MEDIUM

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Capt. F. S. Muzammil Dr. A. S. HajaHameed

Semester	Course Code		Course Cotogomy	Hours/	Credita	Marks for Evaluation			
		ourse Code	Course Category	Week	Creans	CIA	ESE	Total	
Ι	23UPH1CC2P		PH1CC2P CORE – II		3	20	80	100	
Course Title PROPERTIE			S OF MATTER – PRACTICAL						

List of Experiments:

- 1. Determination of the Young's Modulus of a material using non-uniform Bending Method (Pin & Microscope).
- 2. Determination of Surface Tension by Capillary Rise Method.
- 3. Determination of the Co-efficient of viscosity of a Liquid by Burette Method
- 4. Thermal conductivity of a bad conductor using Lee's Disc.
- 5. Verification of Laws of Transverse Vibrations [I & II laws] in a stretched string using a sonometer.
- 6. Determination of the Refractive Index of glass using a prism and a spectrometer.
- 7. Determination of Resistance and Specific Resistance using a Meter Bridge.
- 8. Comparison of radii by capillary flow method.

9. # Measurement of Dielectric constant for solids and liquids using LCR Meter

10. Determination of the temperature coefficient of resistance of the material using post office box.

- New experiment introduced under DBT Star College scheme

Books for Reference:

1. M.N. Srinivasan, S. Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S. Chand&Sons, Reprint 2010.

2. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First Edition, 2007.

Web Resources:

www.physicstutoruials.org

www.sciencelearn.org.nz

https://vlab.amrita.edu/?sub=1&brch=280&sim=550&cnt=1

https://vlab.amrita.edu/index.php?sub=1&brch=280&sim=1518&cnt=4

http://amrita.olabs.edu.in/?sub=1&brch=5&sim=225&cnt=4

http://www.olabs.edu.in/?sub=1&brch=5&sim=224&cnt=2

	Course Outcomes							
Upon suc	Upon successful completion of this course, the student will be able to:							
CO No.	CO No. CO Statement							
CO1	Recall the basic principles of properties of matter and understand the concepts of bending behaviour beams	K2						
CO2	Make practical skills essential for experimentation.	K3						
CO3	Apply experimental approaches to correlate with physics theory to develop practical understanding.	К3						
CO4	Analyze themselves the concept of heat, optics and acoustics	K4						
CO5	Evaluate the ideas required for their higher studies	K5						

Course	Pro	gramm	e Outco	omes (P	Os)	Progra	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	2	2	2	1	2	2	2	2.2
CO2	2	3	2	3	2	2	2	2	3	2	2.3
CO3	2	2	2	3	3	2	3	3	2	2	2.4
CO4	2	1	2	2	2	2	2	3	2	2	2.0
CO5	2	3	3	2	3	3	2	1	2	2	2.3
Mean Overall Score											2.22
Correlation											Medium

Mean Overall Score	Correlation			
< 1.5	Low			
\geq 1.5 and < 2.5	Medium			
≥2.5	High			

Course Coordinator: Dr. A. S. Haja Hameed

Semester	Course Code	Course Cotogowy	Hours/	Cradita	Marks for Evaluation			
	Course Code	Course Category	Week	Creans	CIA	ESE	Total	
I	23UCH1AC1:1	Allied – I	5	4	25	75	100	

Course Title INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY – I

	SYLLABUS								
Unit	Contents	Hours							
I	 INDUSTRIAL CHEMISTRY 1.1.Periodic properties: Ionization potential, electron affinity and electro negativity- Definition, factors affecting and variation in the periodic table. 1.2. Molecular Orbital Theory: LCAO, Bonding, anti-bonding orbital and bond order. MO diagrams of H₂, He₂, N₂, O₂ and F₂ molecules. 1.3. Industrial Chemistry: Fuel gases composition and preparation of Water gas, Producer gas, LPG, Gobar gas and Natural gas. Fertilizers – NPK and mixed fertilizers. *Soap and detergents – An elementary idea of soap and detergent*. SOLUTIONS 2.1. Solutionary Definition. Types of solutions – classification hand and hand hand hand hand hand hand								
п	 2.1. Solutions. Definition, Types of solutions - classification based on the solute and solvent, Ideal and non-ideal solutions, Liquid-Liquid type, Primary and secondary standards, preparation of standard solutions. 2.2. Concentration of Solutions: Molarity, Molality, Equivalent weight – acid, base and salt, Normality, Mole fraction, percentage (W/V, V/V) and Parts Per Million. 	15							
III	 POLYMERS, HETEROCYLIC COMPOUNDS AND STEREOISOMERISM 3.1. Polymers – Definition, classifications of polymers – Natural and synthetic polymers, Thermoplastic and thermosetting polymer. Addition and condensation polymerization. Preparation, properties and uses of polyethylene, *PVC, Teflon*, polystyrene, nylon 6, 6, and Bakelite. 3.2. Heterocyclic compounds – Furan, thiophene and pyridine – Preparation, properties and uses. 3.3. Stereoisomerism: Optical isomerism – lactic and tartaric acid, Racemic mixture and resolution, Geometrical isomerism – cis – trans isomerism, maleic and fumaric acid. 								
IV	 CHROMATOGRAPHY, PHOTOCHEMISTRY AND PHASE RULE 4.1 Chromatography – Definition, classification – principles, Technique and application of TLC. 4.2 Photochemistry: Differences between thermal and Photochemical reactions, photochemical laws – Lambert's law, Beer's law, Grothus - Draper's law, Einstein's law of photo chemical equivalence, *Quantum efficiency*. 4.3 Phase Rule: Phase, Component, Degree of freedom, Phase Rule – definition, one component system –Water system. 	15							
V *	 4.3 Phase Rule: Phase, Component, Degree of freedom, Phase Rule – definition, one component system –Water system. CONDUCTANCE, CORROSION, pH AND BUFFER 5.1. Conductance: specific and equivalent conductance – Determination, Effect of dilution on conductivities, Ostwald's dilution law and Kohlrausch's law, conductometric titrations- Principle, applications (Strong acid vs Strong base and Weak acid and Weak base) and advantages. 5.2. Corrosion: Definition, types, wet and dry corrosion and prevention of corrosion. 5.3. pH and Buffer: *pH, buffer solution*, Henderson-Hasselbalch equation and its importance (no derivation)-Biological importance of pH and Buffer solutions in living system. 								

Text Book(s):

- 1. P. L. Soni, Text book of Inorganic Chemistry, S. Chand & Co., New Delhi, Revised Edition, 2017.
- P. L. Soni and H.M. Chawla, Text Book of Organic Chemistry, S. Chand & Co., New Delhi, 28th Edition, 1999.
- B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, Vishal Publications, Jalandhar, 48th Edition, 2019.

Reference Book(s):

- Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Shoban Lal, Nagin Chand & Co. New Delhi, 23rd, 1993.
- 2. Bahl and Arun Bahl, Advanced Organic Chemistry, S.Chand & Co., New Delhi, 19th Edition, 2005
- 3. R. L. Madan, G.D. Tuli, Simplified Course in Physical Chemistry, S. Chand & Co., New Delhi, 5th Revised and Enlarged, 2009.

Web Resource(s):

- 1. <u>https://onlinecourses.nptel.ac.in/noc22_cy03/preview</u>
- 2. <u>https://www.toppr.com/</u>
- 3. https://byjus.com/chemistry/

Course	Outcomes
Course	Outcomes

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Describe the periodic properties, polymers and conductance	K1
CO2	Explain the terms involved in expressing concentrations of solutions	K2
CO3	Apply chromatographic techniques and photochemical laws	K3
CO4	Predict the stereoisomerism of organic compounds	K4
CO5	Measure the pH and buffer solutions	K5

Relationship Matrix:

Course Outcomes	Pro	gramm	e Outco	omes (P	Os)	Progra	Mean Score of COs					
(COS)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	3	3	3	3	3	3	3	3	3	3	3	
CO2	2	2	2	2	2	2	2	2	2	2	2	
CO3	2	2	2	2	2	2	2	2	2	2	2	
CO4	2	2	2	2	2	2	2	2	2	2	2	
CO5	2	2	2	2	2	2	2	2	2	2	2	
Mean Overall Score										2.2		
	Correlation											

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators: Dr. R. Abdul Vahith

Somester	Course Code		Course Cotogory He		Cradita	Marks for Evaluation			
Semester	U	ourse Coue	Course Category	Week	Creats	CIA	ESE	Total	
I	23UCH1AC2P		1AC2P Allied – II		2	20	80	100	
Course Title VOLUMETRIC ESTIMATIONS - PRACTICAL									
List of Practicals He									
Volumetric Estimation Practicals 1. Estimation of Sodium Hydroxide (Na ₂ CO ₃ Vs HCl Vs NaOH) 2. Estimation of Hydrochloric Acid (H ₂ C ₂ O ₄ Vs NaOH Vs HCl)									

3. Estimation of Oxalic Acid (FeSO₄ Vs KMnO₄ Vs $H_2C_2O_4$)

4. Estimation of Ferrous Sulphate (H₂C₂O₄ Vs KMnO₄Vs FeSO₄)

5. Estimation of Ferrous Ammonium Sulphate $(H_2C_2O_4Vs \text{ KMnO}_4 Vs (NH_4)_2\text{Fe}(SO_4)_2 \cdot 6H_2O_4)$

45

6. Estimation of KMnO₄ (K₂Cr₂O₇ Vs FAS Vs KMnO₄)

7. Estimation of Zinc by EDTA (MgSO₄ Vs EDTA Vs ZnSO₄)

8. Estimation of Magnesium by EDTA (MgSO₄ *Vs* EDTA*Vs* MgSO₄)

	<u>Scheme of valuation</u>
Record	– 10 Marks
Procedure writing	– 10 Marks
For Estimation	– 60 Marks
For Estimation Result	<u>s:</u>
	1-2% - 60 marks
	2-3% - 50 marks
	3-4% - 40 marks
>4% - 30) marks

Text Books:

1. Peter McPherson, Volumetric Analysis, Royal Society of Chemistry, 1st Edition 2014.

2. K.B. Baliga et al., College Analytical Chemistry, Himalaya Publishing House, 19th Edition, 2011

3. Venkateswaran V. Veerasamy R. Kulandaivelu A.R, Basic Principles of Practical Chemistry, S. Chand & Co Pvt. Ltd, New Delhi, 2nd Edition1997.

Reference Books:

1. Handbook Of Inorganic Qualitative Analysis by Maharudra Chakraborty, Scifinity Publication; 1st Edition 2019.

2. Vogel, Text Book of Quantitative Chemical Analysis, Pearson Education, 6th edition ,2009.

3. Day R A., Underwood A l., Quantitative Analysis, New York: Pearson Emory University. Print. 6th edition, 1991

Web Resources:

1. https://www.studiestoday.com/useful-resources-chemistry-class-12-chemistry-practicals-volumetric-analysis-estimation-oxalic-0

2. https://ncert.nic.in/pdf/publication/sciencelaboratorymanuals/class XI/chemistry/kelm 206.pdf

	Course Outcomes					
Upon su	Upon successful completion of this course, the student will be able to:					
CO No.	CO Statement	Cognitive Level (K-Level)				
CO1	Recall the principle of volumetric techniques and to classify the methods of preparation of solutions with different concentration.	K1				
CO2	Estimate the concentration of a various solution	K2				
CO3	Apply the principle of volumetric concept in the estimation	К3				
CO4	Analyze the quality of portability of water	K4				
CO5	Assess the quantity of chemical substance in a solution	K5				

Course	Pro	gramm	e Outco	omes (P	Os)	Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	3	2	3	3	1	2	2	2.5
CO2	3	3	3	3	1	3	3	2	2	2	2.5
CO3	3	3	3	2	2	3	3	2	3	1	2.5
CO4	2	1	2	3	3	3	3	3	3	3	2.6
CO5	3	3	2	2	3	3	3	3	3	2	2.7
Mean Overall Score									2.56		
									Cor	relation	High

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. K. Periyasamy

Somester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
II	23UPH2CC3	Core - III	6	6	25	75	100	

Course	Title
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MECHANICS AND RELATIVITY

SYLLABUS					
Unit	Contents	Hours			
Ι	 Impact of Elastic Bodies and Projectile Motion: Impulse and Impact: Impulse of a force –collision –elastic and inelastic collision –Fundamental principle of impact – direct impact of two smooth spheres - loss of kinetic energy due to direct impact –oblique impact of two smooth spheres –loss of kinetic energy due to oblique impact Projectile on Inclined Plane: Range on an inclined plane – range and time of flight down an inclined plane – *maximum range* - two body problem and the reduced mass 	18			
II	 Centre of Gravity, Hydrostatics and Hydrodynamics: Centre of Gravity: Definition – *Distinction between C.G and C.M* - centre of gravity of a solid cone, solid hemisphere, hollow hemisphere Hydrostatics: Pressure and thrust – trust on a plane surface immersed in a liquid at rest – determination of centre of pressure - centre of pressure of a rectangular lamina and triangular lamina immersed vertically in a liquid Hydrodynamics: Equation of continuity – energy of the liquid - Euler's equation for unidirectional fluid flow –Bernoulli's theorem – venturimeter – *pitot tube* – wings of an aeroplane 	18			
III	Moment of Inertia and Friction: Moment of Inertia: Radius of gyration –perpendicular axes theorem –parallel axes theorem –moment of inertia of a thin circular ring, circular disc and solid cylinder – the compound pendulum –period of oscillation – Determination of g Friction: Definitions of static, dynamic, rolling and limiting friction - *laws of friction* – determining coefficient of friction between two surfaces– Equilibrium of a body on a rough inclined plane acted upon by an external force	18			
IV	Centre of Mass and Rocket Motion Centre of mass: Definition – position vector of centre of mass – motion of the centre of mass of a system of particles - conservation of linear momentum of a particle – angular momentum - relation between torque and angular momentum - angular momentum of a system of particles – conservation of angular momentum Rocket motion: Principle – theory – velocity of the rocket at any instant – propulsion system –multistage rocket –*shape of the rocket*.	18			
V *	Relativity: Concepts of space, time and mass –frames of reference –Newtonian principle of relativity –Galilean transformation equations –*Ether hypothesis* – Michelson-Morley experiment –postulates of the Special theory of relativity–Lorentz transformation –length contraction –time dilation – addition of velocities – mass- energy equivalence – Minkowski's four dimensional space–time continuum – the general theory of relativity	18			

Text Book(s):

 R Murugeshan, Mechanics and Mathematical Physics, S. Chand Publications, Third Edition ,2014 Unit – I Section: 1.1, 1.2, 1.4 -1.7, 2.1 – 2.4 Unit – II Section: 3.1, 3.2, 3.4, 3.5, 4.1, - 4.5, 5.1 – 5.4 Unit IV Section : 13.1, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8 – 13.14
 R Murugeshan, Properties of Matter, S Chand Publications, Revised Edition, 2017 Unit –III Section : 7.1, 7.2, 7.4, 7.5, 7.6, 6.10
 R Murugeshan, Modern Physics, S.Chand Publications , 18th Edition, 2017 Unit – V: Section 1.1-1.10, 1.16

Reference Book(s):

1. <u>DS Mathur</u>, Elements of Properties of Matter, S Chand Publications, Revised Edition, 2016 2.<u>DS Mathur</u>, Mechanics, S Chand Publications, Revised Edition, 2000

3.SoniVidwan S, Mechanics and Relativity, PHI Learning Pvt. Ltd., Fourth Edition, 2019

Web Resource(s):

1. Mechanics and Relativity - TU Delft Research Portal, https://research.tudelft.nl > files

2.<u>Special Theory of Relativity – NPTEL https://nptel.ac.in > courses</u>

- 3. Engineering Mechanics IIT Guwahati https://www.iitg.ac.in/rkbc/me101/Presentation/L16-18.pdf
- 4. <u>Fluid Mechanics, IIT Kanpur NPTEL https://nptel.ac.in/courses/112104118</u>

	Course Outcomes						
Upon suc	Upon successful completion of this course, the student will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	a better understanding of the subjects in higher studies by knowing limitation and applications of mechanics	K2					
CO2	enhanced the laboratory skills and problem solving ability in relevant area	К3					
CO3	Analyse the mechanical behaviour of a body for applications in technological developments	K4					
CO4	assimilate the theoretical knowledge and principle of mechanics which enable the student to become self-reliant on advanced level leanings	K4					
CO5	determine forces acting on static and dynamic systems	K5					

Relationship Matrix:

Course	Pro	gramm	e Outco	omes (P	Os)	Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	2	3	3	2	1	2	2	3	2	1	2.1
CO2	2	3	2	3	2	3	2	1	3	1	2.2
CO3	3	3	3	1	1	2	2	1	3	2	2.1
CO4	2	3	2	3	1	2	2	3	3	1	2.2
CO5	2	2	3	2	2	2	2	2	2	3	2.2
Mean Overall Score									2.16		
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥2.5	High

Course Coordinators: 1. Dr. A. Mohamed Saleem 2. Mr. A. Umar Malik

Someston	Course Code	Course Cotogony	Hours/	Credita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Credits	CIA	ESE	Total	
П	23UPH2CC4P	CORE – IV	3	3	20	80	100	

HEAT AND OPTICS - PRACTICAL

List of Experiments:

- Determination of the Young's modulus of a material using Non-uniform bending (Scale & Telescope).
- 2. Static Torsion: Determination of the Rigidity modulus of material.
- Compound Pendulum: Determination of the Acceleration due to Gravity and Radius of Gyration
- 4. Comparison of the co-efficient of viscosities of two liquids using the Burette method.
- 5. Determination of the Specific heat capacity of a liquid using Newton's Law of Cooling.
- 6. Determination of the specific gravity of a solid and liquid using a sonometer.
- 7. Air wedge: Determination of the thickness of a material by forming interference fringes.
- 8. Surface tension and interfacial surface tension by drop weight method.
- **9.** *#* Determination of the specific rotatory power of solution using a polarimeter by monochromatic light. *#*.
- 10. Determination of radii of curvature of convex and concave lenses.

- New experiment introduced under DBT Star College scheme

Books for reference:

 M.N. Srinivasan,S. Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand and Sons, Reprint 2010.
 C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

Web Resources:

www.physicstutoruials.org www.sciencelearn.org.nz http://amrita.olabs.edu.in/?sub=1&brch=5&sim=225&cnt=4 http://www.olabs.edu.in/?sub=1&brch=5&sim=224&cnt=2

Course Outcomes						
Upon suc	Upon successful completion of this course, the student will be able to:					
CO No.	CO Statement	Cognitive Level (K-Level)				
CO1	Recall the basic principles of properties of matter and understand the concepts of bending behaviour beams	K2				
CO2	Make practical skills essential for experimentation.	K3				
CO3	Apply experimental approaches to correlate with physics theory to develop practical understanding.	К3				
CO4	Analyze the concepts of heat, optics and acoustics and understood the measurements of some physical quantities through heat and optical experiments	K4				
CO5	evaluate the characteristics of the semiconductor diodes and its practical applications	K5				

Course	Pro	gramm	e Outco	omes (P	Os)	Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	2	2	2	1	2	2	2	2.2
CO2	2	3	2	3	2	2	2	2	3	1	2.2
CO3	2	2	2	3	3	2	3	3	2	2	2.4
CO4	2	1	2	2	2	2	2	3	2	2	2.0
CO5	2	3	3	2	3	3	2	1	2	2	2.3
Mean Overall Score							2.20				
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥2.5	High

Course Coordinator: Dr.C. Hariharan

Somester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
II	23UCH2AC3:1	Allied - III	4	4	25	75	100	
		•						

Course Title Inorganic, Organic and Physical Chemistry – II

	SYLLABUS	
Unit	Contents	Hours
I	COORDINATION CHEMISTRY AND METALLIC BOND 1.1. Coordination Chemistry: Introduction to co-ordination compounds, Werner's theory; ligands, co-ordination number, denticity, chelation; IUPAC nomenclature of mononuclear coordination compounds, isomerism; Bonding-Valence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of coordination compound 1.2. Metallic Bond: Properties - Electron gas and Band Theories. Semiconductors – Intrinsic and Extrinsic, n and *p- type*, super conductors.	12
Π	 ELECTRON DISPLACEMENT EFFECTS, AROMATICITY AND SUBSTITUTION REACTIONS 2.1. Electron Displacement Effects- Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength. 2.2. Aromaticity – Criteria's – Huckel's rule - aromaticity of benzene, furan, thiophene, pyrrole and pyridine. 2.3. Substitution reactions- mechanism of nitration, halogenation, sulphonation, *Friedel Crafts alkylation and acylation of benzene*. 	12
ш	 CHLORO COMPOUNDS, CHEMOTHERAPHY AND NAME REACTIONS 3.1. Chloro compounds: Preparation and uses of dichloromethane, chloroform, carbon tetrachloride, freons, DDT and BHC. 3.2. Chemotherapy: Sulpha drugs-structure, preparation and uses of sulphapyridine, sulphathiazole and sulphadiazine, Antibiotics –Structure and uses of penicillin–G and *Chloromycetin*. 3.3. Name reactions: Benzoin, Perkin, Cannizzaro, Reimer-Tiemann and Kolbe's reactions. (Mechanism not necessary) 	12

	SOLID STATE AND COLLOIDS	
	4.1 Solid State: Nature of the solid state, law of constancy of interfacial angles, law	
	of rational indices, Miller indices, elementary ideas of symmetry, symmetry	
	elements and symmetry operations, seven crystal systems - X-ray diffraction,	
	Bragg's law. Defects in crystals (stoichiometric and non- stoichiometric).	
IV	4.2. Colloids: Definition, differences between true solution, colloidal solution and	12
	suspension, principle, applications -Electrical properties - Electrophoresis and	
	Electro osmosis (definition and uses only) - protection of colloids - Gold	
	number- *medicinal applications of colloids*.	
	4.3. Emulsion and Gels: definition, types, preparation, properties and applications.	
	CHEMICAL KINETICS, CHEMICAL EQUILIBRIUM AND CATALYSIS	
	5.1 Chemical Kinetics: Rate of a chemical reaction, factors affecting the rate of	
	reactions: concentration, temperature, pressure and catalyst; elementary and	
	complex reactions, order and molecularity of reactions, rate law, rate constant	
	and its units. Arrhenius theory.	
V	5.2 Chemical Equilibrium: Criteria of homogeneous and heterogeneous equilibria.	12
	Decomposition of HI and PCl ₅	
	5.3 Catalysis: Catalysis - Importance of catalysis. Types of catalysis -	
	Homogeneous and heterogeneous catalysis, factors affecting catalysis. Definitions	
	of catalytic promoter, *catalytic inhibitor, catalytic poison*. Theory of catalysis -	
	Acid-base catalysis	

..... Self Study

Text Books:

1. P.L. Soni, Text book of Inorganic Chemistry, S. Chand & Co., New Delhi, 2017, Revised Edition, 2. P.L. Soni and H.M. Chawla, Text Book of Organic Chemistry, S. Chand & Co., New Delhi, 199728th Edition.

3. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, Vishal Publications, Jalandhar, 2017, 48th Edition.

Reference Book(s):

1. B. R. Puri and L.R. Sharma, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., New Delhi, 2020, 55th Edition.

2. A .K. Srivastava, Organic Chemistry, New Age International Publishers, New Delhi, 2002, 1st Edition.

3. R.L. Madan, G.D. Tuli, Simplified Course in Physical Chemistry, S. Chand & Co., New Delhi, 2009, 5th Revised and enlarged Edition.

Web Resource(s):

1. https://onlinecourses.nptel.ac.in/noc19_cy19/preview

2. https://www.youtube.com/watch?v=1zima5tIXbY

3. https://nptel.ac.in/courses/104101128

	Course Outcomes						
Upon suc	cessful completion of this course, the student will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Understand the bonding nature of inorganic compounds and to classify different types of conductors	K1					
CO2	Explain the concept of electron displacement effect and to apply Huckel's rule to identify the aromatic compounds	K2					
CO3	Illustrate the preparation and uses of pesticides and some common drugs	K3					
CO4	Differentiate types of solids and colloids	K4					
CO5	Appraise the rate and molecularity reaction and to explain the application of catalysts	K5					

Course	Pro	gramm	e Outco	omes (P	Os)	Progra	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	2	2	3	3	2	2	1	2.4
CO2	3	3	3	2	2	3	3	2	1	1	2.3
CO3	3	3	3	2	1	3	2	2	2	1	2.3
CO4	3	3	3	2	2	3	2	2	2	1	2.3
CO5	3	3	3	2	1	3	2	2	2	1	2.2
Mean Overall Score								2.3			
	Correlation									Medium	

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. K. Periyasamy

Somestan	Course Code	Course Cotogony	Hours/	Hours/		Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total		
II	23UCH2AC4P	Allied - IV	3	2	20	80	100		

	List of Practicals	Hours
Qualitative analysis of the fe	ollowing organic compounds:	
1	. Carbohydrate	
2	2. Amide	
3	3. Aldehyde	
4	. Ketone	
5	. Monocarboxylicacid	
f	Dicarboxylic acid	
7	A mine	45
Record	<u>Scheme of valuation</u> – 10 Marks	
Procedure writing	g – 10 Marks	
For Organic Anal	ysis – 60 Marks	
For Organic Anal	ysis Results Marks Distribution:	
(i) Special Elemen	ts Present/ Absent - 20 marks	
(ii) Aromatic/ Alip	ohatic - 10 marks	
(iii) Saturated/ Uns	saturated - 10 marks	
(iv) Functional Gro	oup Present - 20 marks	

Text Books:

1. Ganapragasm N S and Ramamurthy G, Organic Chemistry Lab Manual, S. Vishwanathan Printers and Publishers (P) Ltd., Chennai, 2nd Edition, 2007.

2. Venkateswaran V. Veerasamy R. Kulandaivelu A.R, Basic Principles of Practical Chemistry, S. Chand & Co Pvt. Ltd, New Delhi, 2nd Edition, 1997.

3. Furniss B S, et al., Vogel's Textbook of Practical Organic Chemistry, ELBS Longman, London, 7th Edition, 1984.

Reference Books:

1. A. I. Vogel's, Text Book of Practical Organic Chemistry, Prentice Hall, 5th Edition, 1989.

Web Resources:

1. https://jru.edu.in/studentcorner/lab-manual/bpharm/Lab% 20 Manual% 20 -

% 20% 20 Pharmaceutical% 20 Organic% 20 Chemistry.pdf

2.https://ncert.nic.in/pdf/publication/sciencelaboratorymanuals/classXII/chemistry/lelm108.pdf 3.https://faculty.chas.uni.edu/~manfredi/860-121/ORG%20LAB%20MAN%20S08.pdf

	Course Outcomes					
Upon suc	cessful completion of this course, the student will be able to:					
CO No.	CO Statement	Cognitive Level (K-Level)				
CO1	Recall the preliminary tests of organic qualitative analysis.	K1				
CO2	Differentiate the aliphatic and aromatic nature of the organic compounds	K2				
CO3	Examine the nature of the organic compound	K3				
CO4	Separate the functional groups through appropriate chemical reactions	K4				
CO5	Summarize their results of the organic analysis in a scientific way.	K5				

Course	Pro	ogramm	e Outco	omes (P	Os)	Progr	Mean				
Outcomes	DO1	DOJ	DO3		PO5	DSO1	DSO2	DSO3	DSO4	DSO5	Score of
(COs)	101	102	105	104	105	1301	1502	1303	1504	1505	COs
CO1	3	3	3	3	2	3	3	3	2	2	2.7
CO2	3	2	3	3	3	3	3	2	3	1	2.6
CO3	3	2	3	3	2	3	3	3	2	2	2.4
CO4	3	2	1	3	3	3	3	3	3	2	2.6
CO5	3	2	3	1	2	3	3	2	3	1	2.3
								Me	an Overa	all Score	2.52
									Cor	relation	High
1											0

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. Syed Abuthahir

Semester Course Code Course Category Week Credits CIA ESI	Somoston	Course Code	Course Cotogony	Hours/	Credita	Marks for Evaluation			
	Semester	Course Coue	Course Calegory	Week	Creatis	CIA	ESE	Total	
III 23UPH3CC5 CORE - V 4 4 25 75	III	23UPH3CC5	CORE - V	4	4	25	75	100	

Heat, Thermodynamics and Statistical Mechanics

SYLLABUS						
Unit	Contents	Hours				
I	Kinetic theory of Gases: Postulates of Kinetic theory of gases-Expression for the pressure of a gas-*Relation between pressure and kinetic energy* -Mean free path- specific heat capacities of gases- Mayer's relation- specific heat capacity of a gas at constant volume by Joly's differential steam calorimeter - Problems.	12				
II	Radiation and Transmission of Heat: Conduction process- Coefficient of Thermal conductivity- Measurement of thermal conductivity – Forbes' method – Lee's disc method - Thermal radiation- Planck's quantum postulates-Derivation of Planck's radiation law-Derivation of Stefan's law- *Newton's law from Stefan's law*- Determination of Stefan's constant.	12				
ш	Specific Heat: Specific heat capacity of liquids-* Dulong and Pettit's law*- Variation of specific heat and atomic heat with temperature - Newton's law of cooling-Specific heat capacity of liquids-Barton's correction- Einstein's theory of Specific heat capacity of solids.	12				
IV	Thermodynamics: Statements of Zeroth, first, second and third laws of thermodynamics - Isothermal and adiabatic processes -Work done during isothermal and adiabatic changes - Carnot's theorem-Heat engine -Entropy- Principle of increase of entropy – Change of entropy in reversible and irreversible processes- *Change of entropy problems*	12				
v	Statistical Mechanics: Definition of phase-space – Micro and Macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function - Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics	12				

..... Self Study

Text Book(s):

1.Heat and Thermodynamics - Brijlal and N. Subramaniam, P.S.Hemne. S. Chand & Co, New Delhi . Revised Edition. 2010

2. Thermal physics -R. Murugeshan, Kiruthiga Sivaprasath. S.chand & co. Third Revised edition-2012.

Reference Book(s):

 Heat and Thermodynamics - J.B. Rajam and C. L. Arora, Second edition.S. Chand & Co, New Delhi.
 Thermodynamics and Statistical Physics - Sharma and Sarkar, Himalaya publishers, Mumbai.
 https://www.longdom.org/open-access/thermal-power-generation-by-utilizing-waste-heat-energy-90989.html

Web Resource(s):

- 1.<u>https://youtu.be/M_5KYncYNyc</u>
- 2. <u>https://www.youtube.com/watch?v=4M72kQulGKk&vl=en</u>

	Course Outcomes								
Upon suc	Upon successful completion of this course, the student will be able to:								
CO No.	CO No. CO Statement								
CO1	Acquire the basic principles of heat energy, heat conduction and their properties.	K1							
CO2	Obtain the capacity of solving problems related to thermal conductivity and entropies	К3							
CO3	Imbibe the ability to understand the laws of radiation and its visualization in day to day life	K2							
CO4	Explore the ideas of lowering the temperature.	K4							
CO5	Be motivated to carryout research in Heat and Thermodynamics related fields.	K5							

Course	rse Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	2	3	3	1	3	2	2	2	3	2	2.3
CO2	2	2	2	3	2	2	3	2	2	2	2.2
CO3	3	2	3	2	2	2	2	3	1	2	2.2
CO4	2	2	2	2	1	2	3	1	3	3	2.1
CO5	3	2	2	2	2	3	2	2	2	2	2.2
		•				•		Mea	n Overal	l Score	2.2
									Cor	relation	Medium

Mean Overall Score	Correlation				
< 1.5	Low				
\geq 1.5 and < 2.5	Medium				
≥ 2.5	High				

Course Coordinators:

Major. F. S. MUZAMMIL R. Gowthar

Somester	Course Code	Course Cotogory	Hours/ Credit		Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
III	23UPH3CC6P	CORE - VI	3	3	20	80	100	
		CORE-VI	5	5	20	00	10	

THERMAL AND ELECTRICITY - PRACTICAL

S.No.	List of Experiments
1	Determination of the Young's modulus [Y] of a material using Uniform bending (Single Optic Lever).
2	Determination of the Co-efficient of viscosity $[\eta]$ of a highly viscous liquid using Stoke's Method.
3	Measurement of the charge of an electron by Millikan's oil drop method.
4	Construction of AND, OR, NOT and EX-OR gates using NAND.
5	Measurement of specific charge of an electron (e/m ratio) by Thomson's method.
6	Figure of merit of a Sensitive Galvanometer.
7	Potentiometer: Calibration of a Low Range Voltmeter.
8	Bridge rectifier with π -section filter and Zener diodes.
9	Determination of magneto resistance of a semiconductors.
10	Construction of clipping and clamping circuits.

Text Book(s):

1. M.N. Srinivasan, S.Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons, Reprint 2010.

Reference Book(s):

1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

Web Resource(s):

1. www.physicstutoruials.org

2. www.sciencelearn.org.nz

Course Outcomes								
Upon successful completion of this course, the student will be able to:								
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Acquire the basic principles of properties of matter and the underlying concepts of bending behavior of beams.	K1						
CO2	Learn the experimental skills.	K2						
CO3	Understand the measurements of some physical quantities through electrical and magnetism experiments	K3						
CO4	Understand the characteristics of the semiconductor diodes and the practical applications of properties of matter and electronics in their day to day life.	К3						
CO5	Apply the basic requirements for their higher studies and learned the circuit construction in the electricity and electronics experiments .	К5						

Re	elationsh	ip Matri	x:								
Course		Program	me Outco	mes (POs)	Prog	Programme Specific Outcomes (PSOs)				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	1	2	3	2	2	2	3	3	2.3
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	2	2	2	2	2	2	2	3	2	2.2
CO4	3	2	3	2	1	2	2	2	3	3	2.3
CO5	3	2	3	3	2	2	2	2	3	2	2.4
								Me	an Overa	all Score	2.3
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. S. Abbas Manthiri

Mrs. M. Ayesha

Semester	Course Code	Course Cotogowy	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Calegory	Week	Creans	CIA	ESE	Total	
III	23UMA3AC5:2	Allied – V	4	3	25	75	100	

CALCULUS

SYLLABUS					
Unit	Contents	Hours			
I	Higher Derivatives: The nth derivative - Standard results - Trigonometrical transformations - Formation of equations involving derivatives - Leibnitz formula for the nth derivative of a product (Statement only) - Related problems.	12			
II	Jacobian – Curvature: Circle, radius and centre of curvature – Cartesian formula for the Radius of Curvature – The Coordinates of the Center of Curvature	12			
III	Properties of definite integrals – Integration by parts - Reduction formulae $\int x^n e^{ax}$, $\int sin^n x$, $\int cos^n x$, and $\int sin^m x cos^n x$ - Related problems.	12			
IV	Multiple Integral: Definition of the double integral – Evaluation of the double integral – *Application of multiple integrals*	12			
V	Volume of solids of revolution – volumes of solids as double integrals – Volume as a triple integral - *Areas of curved Surface*	12			
*	* Self Study				

Text Book(s):

1. S. Narayanan, R. Hanumantha Rao and T.K. Manicavachagom Pillay, Ancillary Mathematics Volume - I, S. Viswanathan Publishers Pvt. Ltd Revised Edition (2007).

2. S. Narayanan, R.Hanumantha Rao and T.K.Manicavachagom Pillay, Ancillary Mathematics Volume - II, S.Viswanathan Publishers Pvt. Ltd Revised Edition (2007).

UNIT I	Chapter VI	Sections 6.1	T.B.1
UNIT II	Chapter VI	Sections 6.2, 6.4	T.B.1
UNIT III	Chapter 1	Sections 11, 12, 13.1-13.5	T.B.2
UNIT IV	Chapter 3	Sections 2.1, 2.2 & 4.1	T.B.2
UNIT V	Chapter 3	Sections 3, $5.1 - 5.4$	T.B.2

Reference Book(s):

1. T.K.Manicavachagom Pillay and Others, Calculus Volume-I, S. Viswanathan Publishers Pvt. Ltd. (2004).

2. T.K.Manicavachagom Pillay and Others, Calculus Volume-II, S. Viswanathan Publishers Pvt.Ltd. (2004).

Web Resource(s):

1. https://nptel.ac.in/courses/111104092

2. https://nptel.ac.in/courses/111105122

	Course Outcomes						
Upon suc	Upon successful completion of this course, the student will be able to:						
CO No. CO Statement Cogniti (K-Level)							
CO1	Recall and illustrate the examples of Multiple Integrals.	K1					
CO2	Demonstrate and discuss Jacobian – Curvature with examples.	K2					
CO3	Apply domain knowledge for Integration by parts - Reduction formulae	K3					
CO4	Examine methods for Higher Derivatives with illustrate the examples.	K4					
CO5	Study of Application of multiple integrals with suitable examples.	K5					

CourseProgramme Outcomes (POs)					Progra	Mean Score of					
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	1	3	3	1	3	3	3	2	2.5
CO2	3	1	3	1	3	3	2	3	3	1	2.3
CO3	3	3	1	3	3	3	3	3	3	3	2.8
CO4	1	3	3	1	3	3	3	1	3	2	2.3
CO5	3	3	1	3	1	3	1	3	2	3	2.3
								Me	an Overa	all Score	2.4
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

- Dr. P. Muruganatham
 Mr. T. Rabeeh Ahamed

Semester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Calegory	Week	Creans	CIA	ESE	Total	
III	23UMA3AC6:2	Allied – VI	3	3	25	75	100	

ALGEBRA AND TRIGONOMETRY

SYLLABUS					
Unit	Contents	Hours			
Ι	Theory of equations: *Nature of roots* – Relation between the coefficients and the Roots of an algebraic equation – Transformation of equations – Reciprocal equations.	9			
II	Matrices- *Special types of matrices*- Scalar multiplication of a matrix- Equality of matrices, Addition of matrices- Subtraction- Symmetric matrix-Skew symmetric matrix-Hermitian and skew Hermitian matrices- Multiplication of matrices (Problems only).	9			
III	Matrices: *Various types of Matrices* - Rank of a Matrix - Eigen values and Eigen Vectors- Verification of Cayley-Hamilton theorem.	9			
IV	Trigonometry: Expansions of $cosn\theta$ and $sinn\theta$ – Powers of sines and cosines of θ in Terms of functions of multiple of θ .	9			
V	Hyperbolic functions – Simple Problems	9			

..... Self Study

Text Book(s):

1. S.Narayanan, R.Hanumantha Rao and T.K. Manicachagom Pillay, P. Kandaswamy, Ancillary Mathematics, Volume I, S. Viswanathan Publishers Pvt. Ltd. Revised Edition (2007). 2.T.K. Manicavachagom Pillay, T. Natarajan and K.S. Ganapathy, Algebra Volume-II, Ananda Book Depot, Chennai (2019).

UNIT I	Chapter 2	Sections 2.1–2.4	TB-1
UNIT II	Chapter 2	Sections 1-7	TB- 2
UNIT III	Chapter 3	Sections 3.1, 3.2, 3.4.	TB-1
UNIT IV	Chapter 5	Sections 5.1, 5.2	TB-1
UNIT V	Chapter 5	Section 5.4.	TB-1

Reference Book(s):

1. A. Abdul Rashid, Allied Mathematics, Vijay Nicole Publishing Company (2008).

2. S. Arumugam and A. Thangapandi Isaac, Ancillary Mathematics, New Gamma Publishing house (2002).

Web Resource(s):

1. https://nptel.ac.in/courses/111107119

2. https://www.digimat.in/nptel/courses/video/111107119/L01.html

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No. CO Statement								
CO1	Understand of common algebra and how they are used to obtain solutions of matrices then mathematical problems.	K1						
CO2	Derive the Trigonometry Expansions of $\cos \theta$ and $\sin \theta$ – Powers of sines and cosines.	K2						
CO3	Apply algebra and Trigonometry to obtain solutions to mathematical problems.	K3						
CO4	Analyse mathematical problems to determine the suitable functions.	K4						
CO5	Evaluate various Trigonometry functions and roots of algebraic equation, hyperbolic functions.	K5						

CourseProgramme Outcomes (POs)				Progra	Mean Score of						
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	2	1	3	3	3	2	3	2.6
CO2	2	3	3	3	1	3	3	3	1	3	2.5
CO3	3	1	3	3	1	3	1	3	3	3	2.4
CO4	3	2	3	2	1	1	2	3	3	3	2.3
CO5	2	3	1	3	1	3	3	3	3	3	2.5
								Me	an Overa	all Score	2.46
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

- 1. Dr. V. Krishnan
- 2. Mr. T. Rabeeh Ahamed

Semester	Course Code	Course Cotogory	Hours/ Credits		Marks for Evaluation			
	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
III	23UPH3GE1	GENERIC ELECTIVE - I	2	2	-	100	100	

ASTRONOMICAL SCIENCE

	SYLLABUS	
Unit	Contents	Hours
Ι	TELESCOPES: Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes – Hubble space telescope.	6
II	SOLAR SYSTEM: Bode's law of planetary distances – meteors, meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics.	6
III	ECLIPSES: types of eclipses – solar eclipse – total and partial solar eclipse – lunar eclipse – total and partial lunar eclipse – transits. THE SUN:physical and orbital data – solar atmosphere – photosphere – chromosphere – solar corona – prominences – sunspots – 11 year solar cycle – solar flares.	6
IV	 STELLAR EVOLUTION: H-R diagram – birth & death of low mass, intermediate mass and massive stars – Chandrasekhar limit – white dwarfs – neutron stars – pulsars – black holes – supernovae. GALAXIES: classification of galaxies – galaxy clusters –interactions of galaxies, dark matter and super clusters – evolving universe. 	6
V	Position in the Sky: Spherical Polar Coordinates – Celestial Sphere – Altitude and Azimuth – Rotation – Solar and Sidereal Days – Declination and Hour Angle – Time – Right Ascension and Declination – Heliocentric Time – Julian Date – Spherical Trigonometry	6

Text Book(s): 1. BaidyanathBasu, (2001). <u>An introduction to Astrophysics</u>, Second printing, Prentice – Hall of India (P) Ltd, New Delhi

- 2. K.S.Krishnaswamy, (2002), <u>Astrophysics a modern perspective</u>, New Age International (P) Ltd, New Delhi.
- 3. C.R. Kitchin telescopes and techniques, Springer new York Heidelberg Dordrecht London, third edition, 2013

Reference Book(s):

1. Shylaja, B.S. & Madhusudan, H.R., (1999), Eclipse: A Celestial Shadow Play, Orient BlackSwan,

Web Resource(s):

1. https://www.physics.udel.edu/~jlp/classweb2/directory/powerpoint/telescopes.pdf

2.https://phys.libretexts.org/Courses/Grossmont_College/ASTR_110%3A_Astronomy_(Fitzgerald)/08%3 A_Comets_Asteroids_and_Meteors_-The_Leftovers_of_the_Solar_System

3.https://unacademy.com/content/neet-ug/study-material/physics/astronomical-telescopes/

	Course Outcomes						
Upon suc	Upon successful completion of this course, the student will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Stimulating to think the need of difference types of telescope	K1					
CO2	Demonstrate Solar system to understand recent advances in astrophysics	K2					
CO3	Constructing telescope and outlines its application	К3					
CO4	Analyze stellar evolution and help classify galaxies	K4					
CO5	Might sky observation, Develop models, visiting observatories	K5					

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
CO1	3	3	3	3	3	3	3	2	2	3	2.8
CO2	3	3	3	2	3	2	2	3	3	3	2.7
CO3	3	3	3	3	3	3	2	2	3	2	2.7
CO4	3	3	3	3	2	3	3	3	2	3	2.9
CO5	3	3	2	3	3	3	3	2	3	3	2.8
								Me	an Overa	ll Score	2.78
									Cor	relation	High

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. N. Peer Mohamed Sathik

Dr. P. Revathi

Somester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
IV	23UPH4CC7	Core - VII	5	5	25	75	100	

OPTICS AND SPECTROSCOPY

	SYLLABUS	
Unit	Contents	Hours
I	Geometrical optics: Lens systems: Principal focus and Focal plane – first and second principal foci – second principal focus- power of lens – focal length of combination of two thin lenses in contact- cardinal points- principal points – focal points – nodal points. Aberrations: Aberrations - Spherical aberration in lenses - Methods of minimizing spherical aberration - Condition for minimum spherical aberration of two thin lenses separated by a distance- Chromatic aberration in lenses * coma and astigmatism* Eyepieces: Ramsden's eyepieces - Huygen's eyepieces- Comparison of eyepieces.	15
II	Interference and diffraction: Theory of Interference fringes- Fresnel's Biprism: Experiment to determine the Wavelength of light- Air wedge- Determination of the diameter of a thin wire- Interferometer- Michelson's Interferometer- Construction-Working- Measurement of Wavelength of monochromatic light - Fresnel diffraction-Diffraction at circular aperture, straight edge and Narrow slit-Fraunhoffer diffraction-single slit-Double slit	15
III	Polarization: Double refraction-Nicol prism-Polarizer and analyzer-Huygen's theory of double refraction in uniaxial crystals – Fresnel's theory of double refraction - Theory of Plane, Circularly and Elliptically polarized light- Quarter wave plate-Half wave plate- Production and detection of plane, circularly and elliptically polarized light - Optical activity-Specific rotation- *Laurent's half-shade polarimeter*.	15
IV	Fundamental Concepts in Spectroscopy: Properties of Electromagnetic Radiation – Electromagnetic Spectrum – Different types of Molecular Energies – Interaction of Electromagnetic Radiation with Matter – Molecular Absorption of Electromagnetic Radiation – Types of Molecular Spectra – *Characteristics of Spectral lines* – importance of spectroscopy	15
V	 Microwave and Raman Spectroscopy: Microwave Spectroscopy: Differences between Infrared and Microwave Spectroscopy – Theory of Microwave Spectroscopy – Linear Molecules – Spherical Top Molecules –Instrumentation for Microwave Spectroscopy – Applications of Microwave Spectroscopy. Raman Spectroscopy: Introduction – Principle – Characteristic properties of Raman lines *Differences between Raman and IR spectra - Mechanism of Raman effect* Instrumentation – Intensity of Raman Peaks – Applications of Raman Spectroscopy. 	15
VI	Current Trends (For CIA only) Introduction to Fiber Optic Sensors and their Types	
*	* Self Study	

Text Book(s):

- 1. R. Murugeshan and Kiruthiga Sivaprasath, Optics and Spectroscopy, S. Chand & Company Ltd, New Delhi, 7th Revised Edition, 2010.
- 2. Gurdeep R. Chatwal & Sham K.Anand., Spectroscopy (Atomic and Molecular) –Himalaya Publishing House

3. G. Aruldhas., Molecular Structure and Spectroscopy, PHI Ltd, Second Edition 2017

Reference Book(s):

- 1. Ajoy Ghatak, Optics, Tata Mc Graw Hill, New Delhi , 4th Edition, 2009.
- 2. Subrahmanyam, Brij Lal and M. N. Avadhanulu, A Text Book of Optics, S. Chand, New Delhi, 23rd Edition, 2006 2.
- 3. Colin N. Banwell and Elaine M. McCash, Fundamentals of Molecular Spectroscopy, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2010.

Web Resource(s):

- 1. https://nptel.ac.in/courses/104104085/34
- 2. https://www.elprocus.com/diffrent-types-of-fiber-optic-sensors/

Course Outcomes

Upon successful completion of this course, the student will be able to:

1		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the various types of aberrations that can occur in the lenses and the limitations that arise in eyepieces because of them.	K2
CO2	Realize the concept of dispersion, the means of calculating dispersive power, know the instruments to observe it and as an illustrative example its real- world application in the explanation of the formation of rainbows	K2
CO3	Comprehend the concepts of interference, the various applications of it.	K3
CO4	Have a clear idea of the concept of diffraction, polarization and its applications in optical instruments.	К3
CO5	Understand the concept of spectroscopy and apply experimental approaches to correlate with physics theory to develop practical understanding	К2

Relationship matrix

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Seena of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	1	2	3	3	3	2	2	2.0
CO2	3	3	3	1	2	3	3	2	2	2	2.2
CO3	3	3	3	3	3	3	3	3	3	3	3.0
CO4	3	3	1	3	1	2	2	3	1	3	2.2
CO5	3	3	3	3	3	3	2	2	2	3	2.7
								Me	ean Overa	ll Score	2.42
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A.S. Haja Hameed

Mrs. G. Pragadeeswari

Somester	Course Code		Course Cotogony	Hours/	Credita	Marks for Evaluation			
Semester	U	ourse Code	Course Category	Week	Creans	CIA	ESE	Total	
IV	23	UPH4CC8P	CORE – VIII	3	3	20	80	100	
Course Title			MEASUREMENT AND C	ALIBRAT	FION - PR	ACTICA	AL.		

S.No.	List of Experiments
1	Determination of the Young's modulus [Y] of a material: Cantilever Depression (Scale and Telescope).
2	Determination of Rigidity modulus by static torsion method.
3	Determination of the Co-efficient of viscosity $[\eta]$ of a highly viscous liquid using Searle's Viscometer.
4	Study the frequency response of the LCR series resonance circuit.
5	Determination of the EMF of Thermocouple – Direct Deflection Method.
6	Calibration of an Ammeter using a Potentiometer.
7	Measurement of wavelength of monochromatic light using Fresnel Biprism.
8	Determination of the Band Gap Energy [Eg] of a thermistor using a Post Office Box.
9	Measurement of wavelength of monochromatic light using Michelson's interferometer.
10	Construction of NOT, AND, OR and EX-OR gates using NOR

Text Book(s):

1. M.N. Srinivasan, S.Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons, Reprint 2010.

Reference Book(s):

1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

Web Resource(s):

1. www.physicstutoruials.org

2. www.sciencelearn.org.nz

	Course Outcomes						
Upon suc	Upon successful completion of this course, the student will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Acquire the basic principles of properties of matter and underlying the concepts of bending behaviour beams.	K1					
CO2	Learn the experimental skills.	K2					
CO3	Familiarise the concept of heat, optics and acoustics. understood the measurements of some physical quantities through heat and optical experiments.	К3					
CO4	Learn the measurements and calibration techniques of various instruments.	К3					
CO5	Acquire the basic requirements for their higher studies.	К5					

Re	elationsh	ip Matri	x:								
Course		Programi	ne Outco	mes (POs	Prog	Mean Score of					
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	3	2	3	2	2	2	3	3	2.5
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	2	2	2	2	2	2	2	3	2	2.2
CO4	3	2	3	2	3	2	2	2	3	3	2.5
CO5	3	2	3	3	2	2	2	2	3	2	2.4
								Me	an Overa	ll Score	2.4
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Abbas Manthiri

M. Shobanambigai

Compostor	Course Code	Course Cotogowy	Hours/	Credita	Marks for Evaluation			
Semester	Course Coue	Course Calegory	Week	Creatis	CIA	ESE	Total	
IV	23UMA4AC7:2	Allied – VII	4	3	25	75	100	
							•	

DIFFERENTIAL EQUATIONS (For Physics)

SYLLABUS					
Unit	Contents	Hours			
I	Differential Equations of the first order: Definitions – Solution of Differential Equations – Formation of differential equations – Equations of the first order and the first degree – variable separable – Homogenous equations – *Non-homogenous equations of the first degree in x and y^* – linear equation.	12			
II	Linear Differential Equations with Constant Coefficients: The operator D and D^{-1} – Particular integral – Special methods of finding P.I – Equations reducible to the linear homogeneous equation.	12			
ш	Partial Differential Equations: Derivation of partial differential equations – Different integrals of partial differential equations – Solution of partial differential equation in some simple cases – *Some standard types of first order equations* – Lagrange's Equations.	12			
IV	Laplace Transforms: Definitions – Laplace transform of periodic functions – Some General Theorems and problems.	12			
V	The inverse transforms: Results under inverse transforms of functions – Solving ordinary differential equations with constant coefficients using Laplace transforms.	12			
*	* Self Study				

Text Book(s):

S. Narayanan and T.K. Manicavachagom Pillay, Calculus, Volume – III, S. Viswanathan Publishers Pvt. Ltd., Revised Edition (2019).

UNIT I	Chapter II	Sections 4, 5, 6.1 – 6.5
UNIT II	Chapter IV	Sections $1-4$
UNIT III	Chapter V	Sections $1-5$
UNIT IV	Chapter IX	Sections 1 - 5
UNIT V	Chapter IX	Sections 6 - 11

Reference Book(s):

1. S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).

2. A. Abdul Rashid, Allied Mathematics, Vijay Nicole Publication Company.

Web Resource(s):

1. <u>https://www.classcentral.com/course/swayam-ordinary-and-partial-differential-equations-and-applications-17718</u>

2. https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ma10/

3. https://nptel.ac.in/courses/111/105/111105093/

	Course Outcomes						
Upon suc	cessful completion of this course, the student will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Apply domain knowledge for solving first order linear differential equations.	K 1					
CO2	Discuss and solve the linear differential equations with constant coefficients with examples.	K2					
CO3	Solve the partial differential equations and Lagrange's equations with the examples.	K3					
CO4	Investigate Laplace transform of periodic functions and some general theorems with examples.	K4					
CO5	Determine results under inverse transforms of functions with examples and solve differential equations with constant co-efficient	К5					

Course Outcomes (COs)	Pro	gramm	e Outco	omes (P	POs)	Programme Specific Outcomes (PSOs)					Mean Score of
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	2	2	2	3	3	3	2	2	2.4
CO2	3	2	1	2	3	3	3	3	3	2	2.5
CO3	3	3	2	2	2	3	3	3	2	2	2.5
CO4	3	3	2	2	2	3	3	3	2	2	2.5
CO5	3	3	3	1	2	3	3	3	2	2	2.5
								Me	an Overa	all Score	2.48
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

- 1. Dr. U. Abuthahir
- 2. Dr. C. Gurubaran
| Semester | Course Code | Course Cotogowy | Hours/ | ours/ Credita | | Marks for Evaluation | | | |
|----------|-------------|-----------------|--------|---------------|-----|----------------------|-------|--|--|
| | | Course Calegory | Week | Creans | CIA | ESE | Total | | |
| IV | 23UMA4AC8:2 | Allied – VIII | 4 | 3 | 25 | 75 | 100 | | |
| | | | | | | • | | | |

VECTOR CALCULUS AND FOURIER SERIES (For Physics)

SYLLABUS						
Unit	Contents	Hours				
Ι	Fourier Series: Even and Odd Functions – Half Range Fourier Series – Development in Cosine series.	12				
II	Development in Sine Series – Change of interval – Combination of series.	12				
III	Vector Analysis: Level Surfaces – The vector differential operator – Gradient – Direction and Magnitude of gradient – Divergence and curl.	12				
IV	Line integral – Theorem under Line integral – Volume integral – Surface integral.	12				
V	Gauss Divergence Theorem (Statement only) – Stokes Theorem (Statement only) - Simple problems.	12				

Text Book(s):

S. Narayanan, R. Hanumantha Rao and T.K.Manikavachagompillay, P. Kandasamy, Ancillary Mathematics, Volume – II, S.Viswanathan publishers Pvt. Ltd., Revised Edition (2007).

UNIT I	Chapter - 2	Sections 1 to 4, 5.1
UNIT II	Chapter - 2	Sections 5.2, 6, 7
UNIT III	Chapter - 8	Sections 15 to 20
UNIT IV	Chapter - 8	Sections 1 to 5
UNIT V	Chapter - 8	Sections 6 and 9

Reference Book(s):

 S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).
 A. H. Siddiqi & P.H. Manchanda, A first course in Differential Equations with applications, Macmillan Publishers India Limited, 2006.

Web Resource(s):

1. https://nptel.ac.in/courses/111105122

2. https://nptel.ac.in/courses/111101164

	Course Outcomes							
Upon suc	Upon successful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Relate and study the Vector differential operator	K1						
CO2	Acquire more knowledge on line, volume and surface integral	K2						
CO3	Demonstrate and discuss the Half range Fourier series	К3						
CO4	Apply domain knowledge for the sine and cosine series in change of interval	K4						
CO5	Remember the concept of vector and operators with examples	K5						

Course	Pro	gramm	e Outco	omes (P	POs)	Progra	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	2	3	3	2	3	3	2	2	2.4
CO2	3	2	2	3	3	3	2	3	2	2	2.5
CO3	3	3	2	3	3	3	2	3	3	3	2.5
CO4	3	3	1	2	3	3	3	3	1	3	2.5
CO5	1	3	3	2	3	3	2	2	3	3	2.5
Mean Overall Score										2.58	
Correlation											High

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

1. Dr. H. Sheik Mujibur Rahman Mr. T. Rabeeh Ahamed

SemesterCourse CodeCourse CategoryWeekCreansCIAESETotalIV23UPH4GE2GENERIC ELECTIVE – II22-100100	Semester	Course Code	Course Cotogory	Hours/ Credits		Marks for Evaluation		
IV 23UPH4GE2 GENERIC ELECTIVE - II 2 2 - 100 100		Course Code	Course Category	Week	Creans	CIA	ESE	Total
	IV	23UPH4GE2	GENERIC ELECTIVE – II	2	2	-	100	100

MEDICAL PHYSICS

	SYLLABUS	
Unit	Contents	Hours
I	Pressure measurement Eye pressure measurement – Schiotz Tonometer – Goldmann Tonometer – *Comparison between Schiotz and GoldmannTonometers* – Urinary bladder pressure – Direct measurement –Cathetar method.	6
II	Diagnostic Devices X-ray machine – *Comparison between radiography and fluoroscopy* – Angiography-Applications of X-rays Examination –MRI instrumentation.	6
III	Therapeutic Devices Pace maker – *Comparison between external and internal pace maker* – Defibrillators: Internal and external defibrillators –A.C. and D.C. defibrillator.	6
IV	Laser in Medicine Laser – Properties – Principle of Laser action: Spontaneous and Stimulated emission – Population inversion – Applications: LASIK (Laser in-situ keratomileusis) Eye Surgery – Advantages of Laser surgery – Laser based Doppler blood flow meters.	6
V	Ultrasonics in Medicine *Ultrasonics* –Ultrasonic propagation through tissues– B-mode ultrascan– Recording fetal heart movement using Doppler Ultrasonic method– Ultrasonic Imaging System.	6

Text Book(s):

1. **Medical Physics, John R. Cameron,** University of Wisconsin, Madison & James G. Skofronick, Florida State university, Tallahassee, A wiley-Interscience Publication, John Wiley & sons, Singapore.

2.**Biomedical Instrumentation, Dr. M. Arumugam,** Anuradha Publications PVT, Kumbakonam Second Edition, Reprint-2010,

Reference Book(s):

1. Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, Second Edition, Prentice Hall of India, PVT, New Delhi, 2005.

Web Resource(s):

1. Cathetar method:

https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Intraabdominal_PressureMonitoring/ Angiography:

https://www.news-medical.net/health/What-is-Angiography.aspx

LASIK Eye Surgery:

https://www.webmd.com/eye-health/lasik-laser-eye-surgery#1-1

https://www.allaboutvision.com/visionsurgery/lasik_laser.htm

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Identify the symptoms related to the pressure in various parts of the body to be measured by medical indicators.	K1						
CO2	Understand the theory and construction of instrument intended for diagnosis and therapy.	K2						
CO3	Understand the basic concept of Laser and to apply newer technology to treat the diseases.	К3						
CO4	Learn the knowledge of ultrasound to detect the diseases.	K4						
CO5	Acquire a scientific awareness on the disease prevention and treatments.	K6						

Course Outcomes	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	1	2	3	2	2	2	3	2	2.2
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	3	2	2	2	2	2	2	3	2	2.4
CO4	3	2	3	2	1	2	2	2	2	3	2.2
CO5	3	2	3	3	2	2	2	2	3	2	2.4
Mean Overall Score										2.3	
Correlation										Medium	

Mean Overall Score	Correlation				
< 1.5	Low				
\geq 1.5 and < 2.5	Medium				
≥ 2.5	High				

Course Coordinators:

Dr. J. Ebenezar

Dr. S. Prabhakaran

Semester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation		
	Course Coue	Course Category	Week	Creuits	CIA	ESE	Total
V	23UPH5CC9P1	Core - IX	3	3	10	40	50

ADVANCED OPTICS EXPERIMENTS AND PYTHON PROGRAMMING -PRACTICAL

SYLLABUS						
Ex.No	List of Experiments					
1	Determination of Young's Modulus - Hyperbolic fringes					
2	Determination of Refractive index using Spectrometer : i- d curve method					
3	Determination of refractive index - Newton's rings method (double convex lens)					
4	Calibration of high range voltmeter by using Potentiometer:					
5	Determination of magnetic susceptibility of a para magnetic substance by Quincke's method					
6	Self-Inductance of the coil by LCR Parallel resonance method					
7	Determine the wavelength of laser light by using transmission diffraction gratings.					
8	Determination of M and B_H by Field along the axis of a coil					
9	Python programmes using Functions					
10	Python programmes using List, String, and Tuples					
* Fe	or Theory Core Course, wherever possible					

Text Book(s):

- 1. M.N.Srinivasan, S. Balasubramaniam, R.Ranganathan., A text Book of Practical Physics., Sultan Chand and Sons, Educational Publishers, New Delhi., First Edition, Reprint 2010
- 2. C L Arora., B.Sc., Practical Physics., S. Chand and Company Ltd., New Delhi., 19th Edition, Reprint 2011
- 3. Samir Kumar Ghosh., A Text Book of Advanced Practical Physics. New Central Book Agency. Fourth Edition. 2008.
- 4. C C Ouseph. U J Rao., V Vijayendran., Practical Physics and Electronics. Viswanathan (Printers and Publishers) PVT LTD., First edition reprint 2016.
- 5. Reema Theraja, python programming using problem solving approach, oxford university press, second edition,2022

Reference Book(s):

- 1. G. L. Squires., Practical Physics., Cambridge University Press., Fourth edition-2014
- B.L. Worsnop, H. T. Flint, Advanced Practical Physics, Khosla Publishing House, Reprint-2021
 Debasish Chattopadhyay, Phatik Chandra Rakshit, An Advanced Course in Practical Physics,
- New Central Book Agency; 8th Revised edition-2013

Web Resource(s):

- 1. <u>https://www.myphysicslab.com</u>
- 2. <u>https://www.reddit.com/r/Physics/comments/6otz6i/best_online_resources_for_physics_students/</u> ?rdt=57605

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Acquired experimental skill to perform experiments with minimum errors.	K1 & K2						
CO2	Correlate and confirm the theatrical prediction with experimental results	K2						
CO3	Learned to do measurements on various meters, plotting graphs and do calculations to evaluate final physical quantities with ease.	К3						
CO4	Write their own python program for solving small problems in physics	К3						
CO5	install, run and debug the python programming	K4						

Course]	Program	ne Outco	;)	Progr	Mean Score of					
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	1	3	2	2	2	1	2	3	2.1
CO2	2	3	2	1	3	1	3	2	3	2	2.2
CO3	3	2	3	2	1	2	2	3	2	1	2.1
CO4	2	1	2	3	2	2	3	2	2	2	2.1
CO5	1	3	2	2	3	3	2	1	2	2	2.1
Mean Overall Score							2.1				
Correlation										Medium	

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Ishaq Ahamed Mr. J. Umar Malik

Somester	Course Code	Course Cotogory	Hours/	Credita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
V	23UPH5CC9P2	Core IX	3	3	10	40	50	
			•					

ANALOG ELECTRONICS AND MICROPROCESSOR - PRACTICAL

SYLLABUS					
Ex.No	List of Experiments				
1	FET Characteristics				
2	Adder and Subtractor using Op-Amp IC741				
3	Integrator and Differentiator using Op-Amp IC741				
4	Astable multivibrator using Op-Amp				
5	Colpitt's Oscillator using transistor				
6	Block Transfer of Data using µp 8085				
7	Eight bit Addition and Subtraction using µp 8085				
8	Sorting of Data in Ascending order and Descending order using µp 8085				
9	Conversion of Binary Numbers to BCD				
10	#Electrical and Electronic Patents in Patent Databases				
# D	emonstration				

Text Book(s):

1.M.N. Srinivasan, S. Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand and Sons , Reprint 2010

Reference Book(s):

1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

Web Resource(s):

- 1. www.physicstutoruials.org
- 2. www.sciencelearn.org.nz

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	develop the skills in analog experiments	K2						
CO2	gain a clear understanding of operations of electronic circuits.	K1						
CO3	learn the applications of operational amplifier	K3						
CO4	practice the assembly language programs of 8085 microprocessor using trainer kit.	K4						
CO5	acquire the basic concepts required for their higher studies	K5						

	Relation	ship Mat	rix:								
Course		Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	2	3	3	3	3	3	3	2	2.7
CO2	3	3	3	2	2	2	2	1	3	3	2.4
CO3	3	2	3	2	2	3	3	2	1	2	2.3
CO4	3	2	3	2	3	2	3	1	3	3	2.5
CO5	3	3	2	1	3	2	3	2	3	3	2,5
Mean Overall Score									2.48		
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

- 1. Dr. A. Abbas Manthiri
- 2. Dr. S. Abbas Manthiri

Somoston	Course Code	Course Cotogony	Hours/	Credita	Marks for Evaluation			
Semester	Course Code	Course Category	Week	Credits	CIA	ESE	Total	
V	23UPH5CC10	Core – X	5	5	25	75	100	

Course 2	Fitle
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ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM

SYLLABUS					
Unit	Contents	Hours			
I	Electrostatics Gauss law – Electric field due to a uniformly charged sphere – uniform infinite cylinder – *Coulomb's theorem* – mechanical force experienced by unit area of a charged conductor – Energy stored per unit volume in the medium surrounding the charged conductor Capacitance of a conductor - Principle of a capacitor – Capacitance of spherical and cylindrical capacitors – Capacitance of parallel plate capacitor partly filled with dielectric slab – energy stored in a charged capacitor – loss of energy on sharing of charges between two capacitors – Types of capacitors: Mica capacitor and Electrolytic capacitor	15			
п	Magnetic Properties of MaterialsMagnetic induction (B) – Magnetization (M) - Magnetic susceptibility (χ) – Magneticpermeability (μ) - *Properties of dia, para and ferromagnetic materials* Anti-ferro andferrimagnetism – Langevin's theory of dia and paramagnetism - Weiss's theory ofFerromagnetism – Experiment to draw M-H curve (Horizantal model) – Determination ofsusceptibility : Curie balance method – Magnetic circuit	15			
ш	Current Electricity Kirchoff's laws – Wheatstone bridge - Carey Foster's bridge – Specific resistance - Potentiometer – *Calibration of ammeter, low range voltmeter* – Seebeck effect – laws of thermo emf – Measurement of thermo emf using potentiometer – Peltier effect – Demonstration of Peltier effect by S.G Sterling method The Biot-Savart law – Magnetic intensity at a point due to a current carrying straight conductor, axis of a circular coil and solenoid – Force on a conductor current-carrying current in a magnetic field – Moving coil ballistic galvanometer – damping correction	15			
IV	Electromagnetic Induction Faraday's Laws of electromagnetic induction – Self induction - Self inductance of a long solenoid – Determination of self inductance by Anderson's Bridge method – Capacitance by Wein's bridge – Mutual inductance – *mutual inductance of long solenoid* - Experimental determination of mutual inductance- Coefficient of coupling	15			
V	Alternating Current (A.C) Peak value, Mean value, Form factor and effective value of an alternating current– A.C circuit containing Resistance, Inductance and Capacitance in series – series resonance circuit – The Q factor – parallel resonant circuit (LCR) – power in A.C circuit containing Resistance, Inductance and Capacitance – Transformer construction – Theory – on load – on no load – *losses and uses of transformers*	15			
VI	Current Trends (For CIA only) Super Capacitor Types – Electrostatic double-layer – capacitors – Pseudo capacitors – Hybride capacitors – properties of super capacitor ** Self Study				
	····· > •·· > •·· > •·· > •·· >				

Text Book(s):

1. R.Murugeshan, Electricity and Magnetism ,S.Chand & company, Fourth Revised Edition 2002 Unit – I : 2.2, 2.5, 2.8, 2.11 - 2.13, 4.1 - 4.4, 4.7, 4.9, 4.11, 4.13 Unit – II: 15.1, 15.2, 15.4 - 15.9, 15.11 – 15.14, 15.18 – 15.19 Unit – III: 6.6, 7.1, 8.1 – 8.4, 10.2 - 10.4, 10.6, 10.11 Unit – IV: 11.1 - 11.4, 11.6, 11.6 - 11.7 – 11.10, 19.5 Unit – V: 13.1 - 13.4, 13.7

Reference Book(s):

- 1. Brijlal and N.Subramaniam, Electricity and Magnetism, Ratan Prakash Mandir, S.Chand& company, New Delhi
- 2. K.KTiwari, Electricity and magnetism, S Chand Publishing, New Delhi, Reprint 2020.

Web Resource(s):

- 1. http://www.kau.edu.sa/GetFile.aspx?id=158642&fn=EMNotes.pdf
- 2. https://web.njit.edu/~vitaly/121/notes121.pdf
- 3. https://testbook.com/physics/supercapacitor

	Course Outcomes								
Upon suce	Upon successful completion of this course, the student will be able to:								
CO No.	CO Statement	Cognitive Level (K-Level)							
CO1	Acquire the knowledge of electric and magnetic fields. Apply the concepts to calculate electric fields due to various charge distributions and magnetization of a material.	К3							
CO2	Understood the theoretical concepts of various magnetic materials.	K1							
CO3	Understanding the concepts of magnetic fields and compare their relationship to electrical fields.	K2							
CO4	Able to perform evaluation and estimate parameters involving electric and magnetic fields.	K4, K5							
CO5	Able to design electrical circuits and equipment to measure the electrical parameters.	K6							

Relationship Matrix:

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
CO1	3	3	2	3	3	2	3	2	2	3	2.6
CO2	3	3	2	2	3	2	2	3	3	3	2.6
CO3	3	3	3	2	3	3	2	2	3	2	2.6
CO4	2	3	2	3	2	3	2	3	2	3	2.5
CO5	3	3	2	3	3	3	2	2	3	2	2.6
Mean Overall Score											
Correlation											HIGH

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Mr. S. Mohamed Ibrahim Sulaiman Sait Dr. C. Hariharan

Semester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
V	23UPH5CC11	Core-XI	5	5	25	75	100	

ATOMIC PHYSICS

SYLLABUS							
Unit	Contents	Hours					
I	Positive ray analysis Production and properties of positive rays– Positive Ray Analysis - Thomson's Parabola method – Determination of mass -Discovery of stable isotopes –Aston's Mass spectrograph –Bainbridge's Mass spectrograph –Dempster Mass spectrograph -Critical Potentials- Experimental determination -Franck and Hertz's method.	15					
п	Photo Electricity The nature of Photo-particles Lenard's method to determine e/m for photoelectrons - Richardson & Compton experiment – Experimental investigations on the Photoelectric effect- Laws of Photoelectric emission- Einstein's Photoelectric equation and its verification by Millikan's experiment – Photoelectric cells: Photo-emissive cell – *Photo-voltaic cell*- Applications- Exposure meter in photography Photomultiplier – exposure meter in photography – Sound reproduction in films – Automatic operation of street light.	15					
III	Vector atom model Introduction – spatial quantization – spinning electrons - Various quantum numbers - L-S and j-j couplings – Pauli's exclusion principle – applications - *magnetic dipole moment of electron due to orbital and spin motions* – Bohr magneton – Stern and Gerlach experiment – spin orbit coupling.	15					
IV	 Optical Spectral Lines Spectral terms and notation- Selection rules – intensity rule and interval rule Fine Structure of sodium D lines – hyperfine structure – Zeeman effect- Experimental arrangement for the normal Zeeman effect-Expression for the Zeeman shift–*Larmor's theorem* – Debye's quantum mechanical explanation of the normal Zeeman effect – Quantum mechanical explanations of Anomalous Zeeman effect — Stark effect. 	15					
V	X-Rays X-Rays – Production of X-Rays- X-Ray absorption edge-The Laue's experiment-*Bragg's Law* – Bragg's X-ray spectrometer – determination of crystal structure – The powder crystal method – Rotating crystal method-Origin and analysis of Continuous and Characteristic X-ray spectra–Mosley's law and its importance – Compton effect – Expression for change in wavelength– Experimental verification.	15					
*	* Self Study						
Text Bo	ook(s):						
S.Chan	 1 & Co Publications, Reprint 2010. Unit – I: Chapter 5.1-5.6, 6.8,6.10 Unit – II: Chapter 8.1-8.6 	,					

Unit – III: Chapter 6.12 - 6.21

Unit – IV: Chapter 6.22 - 6.28

Unit – V: Chapter 7.1, 7.2,7.5, 7.6-7.9,7.11-7.14

Reference Book(s):

N. Subramaniam and Brijlal, Atomic and Nuclear Physics –Sultan Chand, NewDelhi. 1994.
 Arthur Beiser, Concepts of Modern Physics, McGraw Hill Publications, Vth edition.1996.

Web Resource(s):

- 1. https://iopscience.iop.org/book/978-1-64327-404-1
- 2. https://nptel.ac.in/courses/115/101/115101003/

Course Outcomes

Upon successful completion of this course, the student will be able to:

1	L ,	
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	study about the properties of positive rays and photo electric effect and its applications	K1
CO2	understand the evolution of different atomic models and their merits and limitations.	K2
CO3	learn the practical experiments and laboratory skills.	К3
CO4	analyse the effect of applied magnetic and electric fields of atomic spectra and X-rays	K4
CO5	Choose suitable spectroscopic technique and examine the chemical composition of a material. familiarize to differentiate various types of spectra and use the fundamental ideas for pursuing higher studies.	К5

Relationship Matrix:

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	2	3	3	2	2	2	2	2	2.4
CO2	2	3	2	3	2	2	2	2	3	2	2.3
CO3	2	2	2	3	3	2	3	3	2	2	2.4
CO4	2	1	2	2	2	2	2	3	2	2	2.0
CO5	3	2	3	2	3	3	2	2	2	2	2.4
Mean Overall Score											
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. S. Abbas Manthiri

Mr. S. Mohamed Ibrahim Sulaiman Sait

Semester	Course Code	ourse Code Course Cotegory		Credita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
V	23UPH5CC12	Core - XII	5	5	25	75	100	

NUCLEAR PHYSICS

	SYLLABUS	
Unit	Contents	Hours
I	Nuclear Structure and Models Classification of nuclei – properties of nucleus: nuclear size –* nuclear mass* – nuclear density – charge – spin – dipole moment – quadrupole moment — Binding energy – nuclear stability – mass defect and packing fraction –Non existence of electrons inside nucleus– nuclear forces – Characteristics of nuclear forces–Meson theory of nuclear forces – liquid drop model - Shell model – Collective model.	15
Π	Radioactivity and Radiations Natural Radioactivity - Properties of α , β and γ rays – Soddy Fajan's law – law of Radioactive disintegration – half life period – mean life period – measurement of decay constants– law of successive disintegration – radioactive dating – age of the earth – Radiocarbon dating – Biological effects of nuclear radiations. Range of α particles (Definition) – Bragg's experiment to determine range of α -particle – Beta ray spectra – origin of line and continuous spectra – neutrino theory of beta decay - K-electron capture – Determination of wavelength of gamma rays–*Origin of γ ray* –Nuclear isomerism – Internal conversion.	15
III	Particle accelerators and Detectors Cockcroft Walton voltage multiplier – Linear accelerator – cyclotron – synchrocyclotron – Betatron – Proton synchrotron. Ionisation chamber – Solid state detectors–Proportional counter - G.M. Counter – Wilson cloud chamber – Bubble chamber –Scintillation counters.	15
IV	Nuclear fission, Fusion and radiation hazards Nuclear Fission – energy released in fission – Bohr Wheeler's theory of fission -chain reaction –Atom bomb–nuclear reactor –PWR – BWR – Fast breeder reactor–Nuclear Fusion – sources of stellar energy – thermonuclear reaction – controlled thermonuclear reactions. Radiation hazards – radiation levels for safety –protection methods – *nuclear disasters – nuclear waste disposal*	15
V *	Nuclear Reactions and elementary particles Bohr's theory of Nuclear reactions – Q value - types of nuclear reactions – energy balance in nuclear reactions –Threshold energy of an endoergic reaction – preparation of radio elements – Applications of radioisotopes Classification of elementary particles – *particles and antiparticles* – fundamental interactions – quantum numbers – conservation laws and symmetry (CPT) – quark model.	15

Text Book(s):

1. Modern Physics – R. Murugesan and KiruthigaSivaprasath, S.Chand& Company Ltd, New Delhi., 2019 Unit – I: 27.1 – 27.5, 27.6 – 27.12

Unit – II: 31.2 – 31.6, 31.10,3.11, 31.19, 31.21 – 31.27

Unit – III:30.1 – 30.8, 30.9 ; 29.3 –29.5 – 29.7, 29.9, 29.12

Unit – IV:35.1 – 35.9, 36.1 – 36.3; 32.1 – 32.5

Unit – V: 34.2 – 34.6, 3.10, 3.11; 38.1- 38.7

Reference Book(s):

- 1. Elements of Nuclear Physics M.L.Pandya, RPS Yadav, , KedarNath, Ram Nath, New Delhi.
- 2. Nuclear Physics, D.C. Thayal, Himalaya Publisher house. 2011.
- 3. Nuclear Physics, Sathyaprakash, S.Chand Publisher, 2005.

Web Resource(s):

- 1. <u>http://www.freebookcentre.net/Physics/Nuclear-Physics-Books.html#google_vignette</u>
- 2. <u>https://iopscience.iop.org/book/978-0-7503-1140-3</u>

	Course Outcomes									
Upon suc	Upon successful completion of this course, the student will be able to:									
CO No.	CO No. CO Statement									
CO1	Acquire the knowledge of fundamentals of nuclear properties and apply the concepts to calculate various parameters of nucleus.	K1, K3								
CO2	compare various nuclear models.	K2								
CO3	Analyse the working of nuclear reactors and their application in daily life.	K4								
CO4	Able to estimate problems involving nuclear power.	K5								
CO5	Able to generalise the effect of nuclear radiation.	K6								

Relationship Matrix:

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Searc of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	2	3	3	2	3	2	2	2	2.4
CO2	3	3	2	2	3	2	2	3	3	3	2.6
CO3	3	3	2	2	3	3	2	2	3	2	2.5
CO4	2	3	2	3	2	3	2	2	2	3	2.4
CO5	3	2	2	3	2	3	2	2	3	2	2.4
Mean Overall Score											
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators: Dr. N. Peer Mohamed Sathik Dr. C. Hariharan

Somoston	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
Semester C	Course Coue	Course Category	Week	Creatis	CIA	ESE	Total	
V 23	23UPH5DE1A	Discipline Specific Electives – I	5	4	25	75	100	

SEMICONDUCTOR DEVICES AND CIRCUITS

	SYLLABUS	
Unit	Contents	Hours
I	Special-Purpose DiodesZener Diode and its characteristics – Varactor Diode – Light-EmittingDiode (LED) – Current and Voltage Characteristics of LEDs – Advantages of LEDs– *Multicolour LEDs–Application of LEDs*– Photo-diodes – Operation andCharacteristics-Applications of Photo-diodes – Schottky Diode.	15
II	Special Devices Unijunction Transistor (UJT) – Equivalent Circuit of a UJT – Characteristics of UJT – Advantages of UJT – Applications of UJT – Relaxation Oscillator – Construction and working of FET -Output Characteristics of FET – Parameters of JFET.	15
III	 Amplifiers and Oscillators Single Stage Amplifiers –Single Stage RC Coupled Transistor Amplifier Phase Reversal – DC and AC Equivalent Circuits – Load Line Analysis – Voltage Gain – Feedback in Amplifiers – Principle, gain and advantages of Negative Voltage Feedback – Oscillatory Circuit– Barkhausen Conditions for Oscillations – *Explanations for the Barkhausen Conditions* - Colpitt's Oscillator - Hartley Oscillator. 	15
IV	Operational Amplifier(15 Hours)Operational Amplifier – Characteristics of an Op-Amp – InvertingAmplifier – Inverting Summing Amplifier (Adder) – Non-Inverting Amplifier –Difference Amplifier (Subtractor), Differentiator and Integrator circuits – Wien'sbridge oscillator – Monostable Multivibrator using Op-Amps.	15
v	Modulation and DemodulationRadio Broadcasting, Transmission and Reception – Modulation –Necessity for Modulation – Types of Modulation –Amplitude Modulation –Modulation Factor - Analysis of AM Wave - Sideband Frequencies in AM wave –Power in AM wave – Limitations of AM – Frequency Modulation - Theory ofFrequency Modulation - *Comparision of AM and FM* – Demodulation –Necessity for Demodulation – Essentials of Demodulation – AM Radio Receivers– Superheterodyne Radio Receiver –Advantages	15

Text Book(s):

1. V.K. Mehtha and Rohit Mehta, Principle of Electronics , S. Chand & Company, New Delhi, XI Edition (2014)

Unit–I: 6.25, 6.26, 6.27, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 17.3, 17.15, 17.16, 17.17, 17.18

Unit–II: 8.1, 8.4, 8.5, 8.7, 8.10, 8.12, 8.15, 8.26, 8.27, 9.2, 9.7, 9.12, 19.1, 19.2, 19.3, 19.4, 19.5, 19.6, 19.8, 19.13, 19.14

Unit–III: 10.1, 10.4, 10.5, 10.7, 10.8, 10.9, 13.1, 13.2, 13.3, 13.4, 14.3, 14.5, 14.7, 14.10, 14.11.

Unit–IV: 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.9, 16.10, 16.11, 16.12, 16.3, 16.14, 16.15, 16.18, 16.19, 16.20

 V. Vijayendran, Introduction to Integrated Electronics: Digital & Analog, S. Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, I Edition (2007) Unit – V: 13.3, 13.4, 14.3, 14.4. 14.5, 14.8, 14.9, 14.10, 15.3, 15.4

Re	eference	e Book(s):					
1.	1. Bhargava, Kulshreshtha and Gupta, Basic Electronics and Linear Circuits, Tata Mc Graw Hill Publishing Company Ltd. New Delbi, V Reprint (1992)						
2	Publishing Company Ltd., New Deini, V Keprint, (1992),						
2. 3.	Applie	ed Electronics, R. S. Sedha, IV Edition (2008), S. Chand Publictions, New Dell	ni.				
W	eb Res	ource(s):					
1.	https:/	//www.elprocus.com/semiconductor-devices-types-and-applications/					
2.	https:/	//www.coursera.org/learn/transistor-field-effect-transistor-bipolar-junction-trans	<u>istor</u>				
3.	https:/	//nptel.ac.in/courses/108/108/108108112/					
4.	https:/	//uafulucknow.ac.in/wp-content/uploads/2020/03/Unit-5-Electronics-Operationa	<u>1-</u>				
_	<u>Ampli</u>	<u>ifier.pdf</u>					
5.	https:/	//www.analog.com/en/products/amplifiers/operational-amplifiers.html					
6.	https:/	/www.electronicshub.org/operational-amplifier-basics/					
		Course Outcomes					
Up	oon suce	cessful completion of this course, the student will be able to:					
C	O No.	CO Statement					
(CO1	Learn some basic semiconductor devices, means of identifying them from their coding schemes and finding out their terminals.	K1 & K2				
(CO2	Acquire a knowledge of the principles and functioning of these semiconductor devices and their individual or standalone characteristic features using mathematical and graphical analysis so that they may be helpful in predicting their behavior and functioning when incorporated in circuitry.	К3				
(CO3	Learn the essential techniques of circuit design employing these devices, the analysis of the circuits so constructed and the means of evaluating their parameters and performance using mathematical and graphical tools.	K4				
(CO4 Parameters and performance using mathematical and graphical tools. CO4 Obtain a sound knowledge of the essential theoretical features and concepts such as modulation and demodulation, regulated power supplies, amplification, switching operations so that they may be useful not only for higher studies but also in providing theoretical framework for possible applications beneficial to the society.		K4				
(CO5	Acquire technical skills to wire the circuits and to trouble shoot them as well as to construct of new circuits for specific tasks thereby helping them to become entrepreneurs.	К5				

Course]	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs
CO1	3	3	2	3	3	2	2	2	2	2	2.4
CO2	2	3	2	3	2	2	2	2	3	2	2.3
CO3	2	2	2	3	3	2	3	3	2	2	2.4
CO4	2	1	2	2	2	2	2	3	2	2	2.0
CO5	3	2	3	2	3	3	2	2	2	2	2.4
Mean Overall Score										2.3	
Correlation											Medium

Course Coordinators: Dr. A. Ishaq Ahamed Dr. R. Raj Muhamed

Semester	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
V	23UPH5DE1B	Discipline Specific Electives - I	5	4	25	75	100	

FUNDAMENTALS OF NANOSCIENCE

	SYLLABUS	
Unit	Contents	Hours
I	Introduction to nanoscience Nanomaterials - Basics of nanomaterials - Nanotechnology - Four generations of Nanotechnology – Elementary ideas of nanostructures – Quantum confinement – and Quantum dot - Size dependence of properties- Crystal structures- Face- Centered Cubic nanoparticles.	15
II	Synthesis of Nanomaterials Nucleation and growth of nanomaterials - Self-assembly- mechanical milling - laser ablation - sputtering and microwave plasma - chemical reduction and oxidation – Hydrothermal – micellesand sol-gel processes.	15
ш	Carbon nanotubes and fullerenes Types of carbon nanotubes - Single walled nanotubes (SWNT) - Multi walled Nanotubes (MWNT)- Electrical, mechanical and vibrational properties- Fullerenes - Properties of fullerenes - *Applications of fullerenes*.	15
IV	Quantum and biological nanostructures Preparation of quantum nanostructures -Size and shape dependent optical emission – Quantum confinement and quantum dot (qualitative study) in semiconductors - origin of charge on colloidal sols, zeta potential, catalytic and photocatalytic properties - Applications –Infrared Detectors- Quantum dot Lasers- Biological nanostructures- *Examples of Proteins*.	15
V	Characterization Techniques Particle size determination - X-ray diffraction (XRD) – IR and Raman Spectroscopy – Photoluminescence (PL) – Surface analysis - Scanning Electron Microscope (SEM) – Transmission Electron Microscope (TEM) and Atomic Force Microscope (AFM).	15

Text Book(s):

1. S. Shanmugam, "Nano Technology", MJP Publishers, Second edition, 2010.

- 2. C.P. Poole and F.J. Owens, "Introduction to Nanotechnology", Wiley- Interscience, (2003).
- 3. M.A. Shah Tokeer Ahmad, "Principles of Nano Science and Nanotechnology", Narosa
- 4. Biomaterials: A Nano Approach, S Ramakrishna, M Ramalingam, T.S. Sampath

Kumar, Winston O. Soboyejo, Published by CRC Press.

Reference Book(s):

- 1. "Nanomaterials", A.K. Bandyopadhyay, New Age International Publishers, (2008).
- 2. Sergeev, G.B. Nanochemistry, Elsevier, B.V. 2010
- 3. Schmid, G. (Ed.), "Nanoparticles", Wiley-VCH Verlag GmbH & amp; Co. KgaA.2004
- 4. Rao, C.N.R., Müller, A. and Cheentham, A.K. (Eds.), "Chemistry of Nanomaterials",

Wiley – VCH. 2005

Web Resource(s):

- 1. http://www.trynano.org/
- 2. https://www.nanowerk.com/111
- 3. https://www.nanotec.org.uk/report/chapter2.pdf
- 4. https://onlinecourses.nptel.ac.in/noc19_mm21/preview
- 5.https://www.classcentral.com/course/swayam-nanotechnology-science-and-applications-14206

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO No. CO Statement							
CO1	Acquire knowledge about the structure and properties of nanomaterials	K1,K2						
CO2	Develop the skills to synthesis and analyze the nanomaterials	K1,K2						
CO3	Understand quantum and biological nanostructures	K3						
CO4	Learn the applications of nanomaterials	K4						
CO5	Learn the evaluation techniques for nanomaterials by spectroscopies and microscopes	К5						

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Searc of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	4	2	3	1	3	4	3	3	4	3	3.0
CO2	3	2	4	1	3	2	3	3	4	3	2.8
CO3	2	2	3	1	2	2	2	2	2	3	2.1
CO4	3	3	4	1	3	2	2	3	4	3	2.8
CO5	4	2	4	1	2	2	3	4	4	3	2.9
Mean Overall Score									2.72		
	Correlation										high

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A.S. Haja Hameed Dr.P. Revathi

Semester	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
V	23UPH5SE1	Skill Enhancement Course -I	2	1		100	100	

SCIENTIFIC PROGRAMMING IN PYTHON

	SYLLABUS	
Unit	Contents	Hours
I	Python Fundamentals Introduction: Python Programming language – History – Features – Formal and natural languages – difference between brackets, braces and parenthesis- Variable: values and types – *Keywords* – type conversion: implicit and explicit types, syntax and examples	6
II	Operators Operator's classifications: arithmetic, relational, logical, membership and identity operators – Expression – order of operations- interactive and script mode.	6
III	Conditional statements Branching type: if statement – if-else statement – if-elif-else statement – nested if- else statement Looping type: for loop –range function – for loop with else – while loop – *while loop with else* – Nested loops: nested for loop – nest while loop Control statements: continue – break	6
IV	Function Introduction – syntax of function – Type conversion in function: implicit and explicit – math functions: import math functions: sqrt, pi, e, radiant, degree, log, exp, pow – Adding new function: definition and uses – flow of execution - *parameters and arguments* – Importing with from, return values, incremental development - Boolean functions – recursion.	6
V	String, List and Tuples String is a sequence – String slice – immutable string –string methods –the in operator – string operations List – values and accessing elements – list are mutable – deleting elements from list – Built in list operations Tuples creating - accessing values - tuples assignment - Tuples as return values - Basic tuples operations	6

..... Self Study For Theory Core Course, wherever possible

Text Book(s):

- 1. Reema Theraja., Python Programming, Using problem solving approach., Oxford University Press., second Edition., 2022
- 2. Allen B. Downey, Think Python, How to think Like a Computer Scientist., Shroff Publishers &Distributors Pvt.Ltd., 2015
- 3. Martin C. Brown, Python, The complete reference., Mc Graw Hill Education (india), Edition 2018
- 4. Python Material, <u>https://drive.google.com/file/d/1SOBdg6-IHOsRlzEnt6HWsz3duxVIKI57/view?usp=drive_link</u>.

Reference Book(s):

- 1. Qingkai Kong, Timmy Siauw, Alexandre M. Bayen, Python Programming and Numerical Methods, A Guide for Engineers and Scientists, Academic Press., First Edison.2020
- 2. Alex Gezerlis., Numrical Methods in Physics with Python. Cambridge University Press, Second Edition 2023.
- 3. William Miles., Numerical Methods with Python, For the Sciences, CPI Books GmbH, 2010

Web Resource(s):

- 1. <u>https://www.coursera.org/learn/python?specialization=python</u>
- 2. https://learn.microsoft.com/en-us/training/modules/intro-to-python/
- 3. https://www.youtube.com/watch?v=rfscVS0vtbw

Course Outcomes

Upon successful completion of this course, the student will be able to:

-		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Install and run the Python Program	K2
CO2	Design, implement, test and debug the program	К3
CO3	Acquire a skill to write his own program for simple problem in general and physics in particular	K4
CO4	Got self-confident to learn any other programming language	К5
CO5	Enhancing student chance in the job haunt.	K4

Relationship Matrix:

Course Programme Outcomes (POs) Programme Specific Outcomes (PSOs)													
(COs)	(COs)PO1PO2PO3PO4PO5PS01PS02PS03PS04PS05												
CO1 2 3 2 1 2 3 2 1 2 3													
CO2 2 3 2 1 2 1 2 3 3 2													
CO3 3 2 1 2 2 3 2 2 1 2													
CO4 3 2 2 2 3 2 1 2 3 3													
CO5 1 3 2 2 3 3 2 2 2													
Mean Overall Score													
	Correlation												

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Mr. J. Umar Malik Dr. V. Kalyanavalli

Semester Cot	mset one i			'nodita			i uuululi
		Course Category	Week	Creans	CIA	ESE	Total
V 23U	UPH5SE2	Skill Enhancement Course -II	2	1	-	100	100

ELECTRICAL AND ELECTRONIC INSTRUMENTATION

	SYLLABUS	
Unit	Contents	Hours
I	Analog Instruments DC Voltmeter – Multirange Voltmeter – Transistor Voltmeter (TVM) – Solid State Voltmeter – Differential Voltmeter – AC Voltmeter using rectifiers – AC Voltmeter using half wave rectifier *AC Voltmeter using full wave rectifier* –Multimeter Operating Instructions	6
II	Digital Instruments Digital Multimeter – Digital Frequency Meter – Digital Measurement of Time: Time Base Selector – Period Measurement – *Digital Tachometer* – Digital pH meter – Digital Phase Meter – Digital Capacitance Meter	6
III	 Digital Display System and Intellectual Property Rights (IPR) Classification of Displays – Light Emitting Diode – Liquid Crystal Display – Segmental Displays using LEDs – *Electro Luminescent Display*. IPR: Concept of IPR in Electronic Circuits – Design of Semiconductor Integrated Circuits Layout 	6
IV	Wave Analyzers and Harmonic Distortion Basic Wave Analyzer – Frequency Selective Wave Analyzer – Heterodyne Wave Analyzer – Harmonic Distortion Analyzer – Resonance Bridge Method – Wien's Bridge Method–Spectrum Analyzer	6
V	Transducers Classification of Transducers–Resistive Transducer–Strain Gauges–Theory– Inductive transducer–Linear Variable Differential Transducer (LVDT)–Capacitive Transducer–Capacitive Thickness Transducer–Digital speed Transducer– Ultrasonic Temperature transducer	6

..... Self-study portion

* For Theory Core Course, wherever possible

Text Book(s):

1. H.S. Kalsi, Electronic Instrumentation, Third Edition, Mc Graw Hill Education Private Limited, New Delhi, Reprint 2015.

- Unit I: Section 4.3, 4.4, 4.7, 4.9, 4.10, 4.12, 4.13, 4.14, 4.21, 4.26
- Unit II: Section 6.2, 6.3, 6.4, 6.9, 6.10, 6.12, 6.13
- Unit III: Section 2.8, 2.9, 2.10, 2.11, 2.12
- Unit IV: Section 9.2, 9.3, 9.4, 9.5, 9.6
- 2. B.Nagaraj, S. Renuka, B. Rampriya, Transducer Engineering, Anuradha Publications, Chennai, First Edition, 2009

Unit-V Section 1.7.1, 3.1, 3.3, 3.3.1, 4.1, 4.4, 4.8, 4.8.3.3, 5.4.2

Reference Book(s):

1. Prithwiraj Purkait, Budhaditya Biswas, Santanu Das, Chiranjib Koley, Electrical and Electronics Measurements and Instrumentation, Mc Graw Hill Education Pvt. Ltd., New Delhi

2. A.K. Sawhney, A Course in Electrical and Eletronic Measurements and Instrumentation, Dhanpat Rai & Sons, New Delhi, Fourth Edition Reprint 1985

Web Resource(s):

1. https://www.scribd.com/document/558233504/A-K-Sawhney-Puneet-Sawhney-A-Course-in-Electrical-and-Electronic-Measurements-and-Instrumentation-DHANPAT-RAI-Co-Pvt-Ltd-2012 2. https://yidnekachew.wordpress.com/wp-content/uploads/2013/04/transducer-engineering-bynagaraj-11.pdf

Course Outcomes								
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Identify the various parameters that are measurable in electronic instrumentation	K1						
CO2	Analyze the performance characteristics of each electronic instrument	K2						
CO3	Understand the principles of various types of transducer	K1						
CO4	Apply the complete knowledge of various electronics instruments to measure the Physical quantities in the field of science and technology	К3						
CO5	Disseminate knowledge on semiconductor circuit layout design protection and their registration aspects	K4						

Course]	Program	me Outco	mes (POs)	Programme Specific Outcomes (PSOs)						
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs	
CO1 2 2 2 3 2 3 2 3 2 3												
CO2 2 3 3 2 2 2 3 3 2 2												
CO3 3 3 2 2 3 2 2 3 2 2 3 2 2 3												
CO4 3 2 3 2 3 3 2 2 2 3											2.5	
CO5 3 2 2 3 3 2 2									2.4			
Mean Overall Score												
	Correlation											

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Abbas Manthiri Dr. S. Shek Dhavud

SemesterCourse Course CategoryWeekCreatisCIAESEToVI23UPH6CC13P1Core - XIII3310405	Somester	Course Code	Course Cotogony	Hours/	Cradita	Marks	for Eva	luation
VI 23UPH6CC13P1 Core - XIII 3 3 10 40 5	Semester	Course Coue	Course Calegory	Week	Creatis	CIA	ESE	Total
	VI	23UPH6CC13P1	Core - XIII	3	3	10	40	50

GENERAL EXPERIMENTS AND PYTHON PROGRAMMING - PRACTICAL

	SYLLABUS								
Exp.No	Experiments Title								
1	Determination of Young's modulus - Elliptical fringes.								
2	Refractive index of the material of the prism by using Spectrometer : i-i' curve method								
3	Anderson's bridge- Self-inductance of the coil								
4	Determination of M and B _H – Vibration Magnetometer								
5	Determination of the loss of energy per unit cycle due to hysteresis for toroidal material using CRO								
6	Determine the diameter of Lycopodium powder particle using semiconductor laser								
7	Young's modulus by Koenig's method-Non-uniform bending method.								
8	Determination of Hall coefficient using Hall effect set up								
9	Programming examples I : Using Branching statements								
10	Programming examples II : Looping statements								

Text Book(s):

1. M.N.Srinivasan, S. Balasubramaniam, R.Ranganathan., A text Book of Practical Physics., Sultan Chand and Sons, Educational Publishers, New Delhi., First Edition, Reprint 2010

2. CL Arora., B.Sc., Practical Physics., S.Chand and Company Ltd., New Delhi., 19th Edition, Reprint 2011

3. Samir Kumar Ghosh., A Text Book of Advanced Practical Physics. New Central Book Agency. Fourth Edition. 2008.

4. C C Ouseph. U J Rao., V Vijayendran., Practical Physics and Electronics. Viswanathan (Printers and Publishers) PVT LTD., First edition reprint 2016.

Reference Book(s):

1. G. L. Squires., Practical Physics., Cambridge University Press., Fourth edition-2014

B.L. Worsnop, H. T. Flint, Advanced Practical Physics, Khosla Publishing House, Reprint-2021
 Debasish Chattopadhyay, Phatik Chandra Rakshit, An Advanced Course in Practical Physics, New Central Book Agency; 8th Revised edition-2013

Web Resource(s):

1. https://www.myphysicslab.com

2.<u>https://www.reddit.com/r/Physics/comments/6otz6i/best_online_resources_for_physics_students/?rd</u> t=57605

	Course Outcomes									
Upon successful completion of this course, the student will be able to:										
CO No.	CO Statement	Cognitive Level (K-Level)								
CO1	Acquired experimental skill to perform experiments with minimum errors.	K1 & K2								
CO2	Correlate and confirm the theatrical prediction with experimental results	K2								
CO3	Learned to do measurements on various meters, plotting graphs and do calculations to evaluate final physical quantities with ease.	K3								
CO4	Write their own python program for solving small problems in physics	K2								
CO5	install, run and debug the python programming	K4								

Course OutcomesProgramme Outcomes (POs)Programme Specific Outcomes (PSOs)											Mean Score of		
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs		
CO1	CO1 3 2 1 3 2 2 2 1 2 3												
CO2	CO2 2 3 2 1 3 1 3 2 3 2												
CO3	CO3 3 2 3 2 1 2 2 3 2 1												
CO4 2 1 2 3 2 2 3 2													
CO5	CO5 1 3 2 2 3 3 2 1 2 2												
Mean Overall Score											2.1		
									Cor	relation	medium		

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Ishaq Ahamed Mr. J. Umar Malik

Somester	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
Semester	Course Coue	Course Calegory	Week	Creans	CIA	ESE	Total	
VI	23UPH6CC13P2	Core - XIII	3	3	10	40	50	

DIGITAL ELECTRONICS AND MICROPROCESSOR - PRACTICAL

SYLLABUS				
S.No	List of Experiments			
1	Verification of Logic Gates: AND, OR, NOT, NAND, NOR & EX-OR			
2	Verification of De-Morgan's Theorems			
3	Half Adder and Full Adder using Basic Logic Gates			
4	Half Subtractor and Full Subtractor using Basic Logic Gates			
5	Flip-Flops: R-S, Clocked R-S and J-K			
6	1-bit Comparator using a Basic Logic Gates			
7	Ring Counter using D flip flop using IC7474			
8	Eight Bit Multiplication and Division using µp 8085.			
9	Searching for the Biggest and Smallest Numbers of an Array using µp 8085.			
10	Conversion of a Decimal Number to Hexadecimal form and vice versa using µp 8085.			

Text Book(s):

1. M.N. Srinivasan, S. Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand and Sons, Reprint 2010.

2. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Pvt, Ltd, First edition, 2007.

Web Resource(s):

1. www.physicstutoruials.org

2. <u>www.sciencelearn.org.nz</u>

Course Outcomes						
Upon suc	Upon successful completion of this course, the student will be able to:					
CO No.	CO Statement	Cognitive Level (K-Level)				
CO1	develop the skills in analog experiments	K1 & K2				
CO2	learn the applications of operational amplifier.	K2				
CO3	gain a clear understanding of operations of electronic circuits.	К3				
CO4	practice the assembly language programs of 8085 microprocessor using trainer kit	K2				
CO5	acquire the basic concepts required for their higher studies.	K4				

]	Relation	ship Mat	rix:								
Course		Programi	amme Outcomes (POs)			Prog	Mean				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	5	3	1	3	4	3	2	3	2	2.9
CO2	3	5	3	1	3	2	2	2	3	2	2.6
CO3	3	5	3	1	2	2	2	2	3	2	2.5
CO4	3	5	3	1	2	2	3	2	4	4	2.9
CO5	3	5	3	1	2	2	3	2	4	4	2.9
								Mea	an Overa	Il Score	2.76
									Cor	relation	High

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High
	•

Course Coordinators:

Dr. R. Radhakrishnan Mrs. G. Pragadeeswari

Somester	Course Code	Course Catagory	Hours/ Credits		Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
VI	23UPH6CC14	Core - XIV	6	6	25	75	100	

WAVE MECHANICS

SYLLABUS				
Unit	Contents	Hours		
I	Inadequacy of Classical theory Black body radiation – difficulties with classical theory of black body radiation – Planck's hypothesis – Planck's radiation formula- difficulties with classical theory of specific heat of solids – Einstein's theory of specific heat – the Frank-Hertz experiment – Application of Wilson-Sommerfeld: *Quantization rule for the harmonic oscillator and its limitation*	18		
п	Foundations of Wave Mechanics Dual nature of matter – Matter waves (D'Broglie waves) –properties – Davison and Germer's experiment – G.P. Thomson's experiment – velocity of D'-Broglie wave – Wave packet – Group velocity – Phase velocity –Relation between group velocity and phase velocity- Heisenberg's Uncertainty principle –Physical significances of uncertainty relation- *non-existence of the electrons in the nucleus*.	18		
III	Formulation of Wave Mechanics Operators – Basic definitions – Operators associated with dynamical variables- ortho-normal functions – Eigen functions and Eigen values – Hermitian operator – Properties of Hermitian operator- Postulates of Quantum mechanics – Measurability of observables – Superposition state and probability – Expansion theorem – Ehrenfest's theorem.	18		
IV	Schrödinger's Wave Equation Equation of motion of matter wave – Time independent Schrödinger equation – Schrödinger equation for a free particle – Time dependent Schrödinger equation – Physical interpretation of wave function – Normalized wave functions – Orthogonality of wave functions – Solution of Schrödinger equation – Stationary states solution – *Expectation values of dynamical quantities*	18		
V *	Physical applications of 1-D Schrodinger equation The solution of Schrödinger equation of a free particle – Solution of the Schrodinger equation for the particle in a box one-dimensional box (infinite potential well) – The potential step – Linear harmonic oscillator – Eigen values and Eigen functions of the one-dimensional – significance of zero point energy. * Self Study	18		

Text Book(s):

1. Sathya Prakash and G.K. Singh, Quantum Mechanics, First edition,						
Kedar Nath I	Kedar Nath Ram Nath & Co,1991					
UNIT I	Chapter 1	Sections 1.3 - 1.14				
UNIT II	Chapter 2 & 4	Sections 2.2 - 2.10 & 4.1 - 4.4				
UNIT IV	Chapter 2	Sections 2.12 - 2.18				
UNIT V	Chapter 5	Sections 5.1 - 5.5 , 5.9				
2. G. Aruldh	as and P. Rajagopal, Mo	dern Physics, Second edition,				
Prentice Hall	l of India, 2005.					
UNIT III Chapter 5 Sections 5.1 - 5.9						
Reference Book(s):						
1.R. Murugesan, Modern physics, S.Chand & Company Ltd, 4 th edition, 2005						

2.G. Aruldhas, Classical Mechanics, Second edition, Prentice Hall of India,2008

Web Resource(s):

- 1. 1. https://www.if.ufrj.br/~coelho/Newman/Newman24.pdf
- 2. https://www.arthurjaffe.com/Assets/pdf

Course Outcomes

Upon successful completion of this course, the student will be able to:

-	-	
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Stimulate to think the need wave mechanics by demonstrating inadequacy of Classical theory	K1
CO2	Motivate to think experimental ideas to show a existence of matter wave as a group wave	К2
CO3	Train to generate operators to formulate wave mechanics – specifically wave functions and discrete energy values	К3
CO4	Derive the equation of matter waves	K4
CO5	Finding the solution of wave equation to demonstrate the dynamics of certain quantum models	К5

Relationship Matrix:

Course Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	3	3	3	2	3	2	3	2.8
CO2	3	3	2	3	3	2	2	3	3	3	2.7
CO3	3	3	3	3	3	3	2	2	2	3	2.7
CO4	3	2	3	3	3	3	3	3	3	3	2.9
CO5	3	2	3	3	3	3	3	2	3	3	2.8
								Mea	an Overa	all Score	2.78
									Cor	relation	High

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. R. Radhakrishnan Dr. S. Abbas Manthiri

Somostor	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
VI	23UPH6CC15	Core - XV	5	5	25	75	100	

LASER AND MEDICAL PHYSICS

	SYLLABUS	
Unit	Contents	Hours
I	Fundamentals of Lasers Principle and Characteristics of Lasers – Principle of three process: Absorption, Spontaneous and stimulated emission – Einstein theory – Ratio of magnitudes of stimulated and spontaneous emission rates – Principle of Laser action – Population inversion – Active medium and Active centre – Optical resonator – Pumping – Pumping methods: Optical, Electrical pumping, Direct conversion Metastable states – Pumping schemes: Two level and three level pumping schemes.	15
п	Lasers and Applications Mechanism and working function of different types of Lasers: Solid state: Nd-YAG Laser, Gas lasers: Helium-Neon Laser, and Semi-conductor Lasers – Industrial applications: Drilling – Cutting – Welding – Supermarket scanners	15
III	Laser in Medicine and Surgery Laser in Medicine and surgery – *Eye laser surgery* – Photocoagulations – Skin conditioning using Er-YAG – Laser applications in dentistry – Laser Angioplasty – Different laser therapies – Laser Endoscopy	15
IV	 Radiation in Medicine Radiation safety instrumentation – Units of Radiation: One curie – One Roentgen – One rad – One rem – Effects of radiation exposure – Radiation protection: *Stochastic effects – non stochastic effects* – Radiation monitoring instruments: Pocket dosimeters – Film dosimeter – Thermoluminescence dosimeter (TLD) 	15
V	Advances in Biomedical Instrumentation Gamma ray camera – Computer tomography (CT): Principle – working function of CT scanner – *Applications of CT* – Thermography – Different types: Infrared, liquid crystal and Microwave thermography – Medical applications	15

..... Self Study

Text Book(s):

- 1. Engineering Physics –I, Dr.G. Senthil Kumar, VRB Publishers, Chennai, 2015
- 2. An introduction to LASERS Theory and Applications, Dr. M.N. Avadhanulu & Dr. P.S. Hemne,
- S. Chand & Company Ltd., New Delhi, Second Revised Edition, 2012.

3. Biomedical Instrumentation, Dr. M. Arumugam, Second Edition, Reprint-2010, Anuradha Publications PVT, Kumbakonam, 2010.

Reference Book(s):

- 1 Laser theory and applications K. Thyagarajan and A.K. Ghatak, Macmillan India Ltd., Ist Edn, New Delhi, 1999.
- 2. Physics for Engineering, P.K. Palanisamy, Scitech Publishing Pvt. Ltd., Chennai

Web Resource(s):

1. 1. Stochastic effects – Non stochastic effects:

https://www.env.go.jp/en/chemi/rhm/basic-info/1st/03-01-04.html

Eye laser surgery:

https://www.webmd.com/eye-health/lasik-laser-eye-surgery#1-1

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	study the basic concept of Laser and pumping mechanism.	K1						
CO2	learn and compare the working principle of different types of Lasers	K2						
CO3	apply the principle of Laser intended for use in surgery and treatment.	К3						
CO4	estimate the dosage of radiation exposure for ionizing radiation during treatment.	K4						
CO5	anticipate the working mechanism of advanced instrumentation to use in diagnosis.	K5, K6						

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Searc of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	2	3	3	2	2	2	2	2	2.4
CO2	2	3	2	3	2	2	2	2	3	2	2.3
CO3	2	2	2	3	3	2	3	3	2	2	2.4
CO4	2	1	2	2	2	2	2	3	2	2	2.0
CO5	3	2	3	2	3	3	2	2	2	2	2.4
Mean Overall Score										2.3	
Correlation										Medium	

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators: Major. F.S. Muzammil Dr.J.Ebenezar

Semester	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
VI	23UPH6DE2A	Discipline Specific Electives-II	5	4	25	75	100	
	•							

DIGITAL ELECTRONICS AND MICROPROCESSOR

	SYLLABUS	
Unit	Contents	Hours
I	Logic Gates and Logic Circuits Basic Logic Gates, NOT, OR, AND - Logic Gates Circuits and Logic Expressions – Sum of Products (SOP) – Product of Sums (POS) – NAND and NOR Gates Ex-OR and Ex-NOR Gates – Positive and Negative Logic – *Laws of Boolean algebra* – De-Morgan's theorems – NAND as Universal Gate – NOR as Universal Gate – NOR-NOR Network	15
II	Karnaugh Map and Combination CircuitsMinterms – Relation Between K Map and Truth Table – 2- variable, 3-variable and 4- variable K Map using minterms - Don't care conditions - Maxterms– K map using maxterms – Half adder and Full adder – *Half subtrator and Fullsubtractor* – Multiplexer(2-input) – Demultiplexer – Decoder – Encoder	15
ш	Flip-flops, Registers and Counters NAND Latch – SR Flip-flop – D Flip-flop – JK Flip-flop – JK Master-Slave Flip-flop – T Flip-flop – Registers – Shift Register – Shift Right Shift Register – Ring Counter	15
IV	Microprocessor 8085 and instruction set of Intel 8085 Microprocessor Architecture INTEL 8085 – Pin configuration – Opcode and operands – Instruction word size. Addressing modes – Intel 8085 instructions – Data Transfer Group – Arithmetic Group – Logical group – Branch group – Stack, I/O and machine control group.	15
V	Assembly Language Programming and Interfacing Addition, Subtraction, Multiplication, and division of 8-bit numbers – The largest number in data array – Ascending order – Descending order – Square root of a number – move a block of data from one section of memory to another section of memory. Interfacing – Intel 8255 – Interfacing of ADC 0800 (Program for single DC input voltage) – *DAC 0800*.	15

Text Book(s):

 V.Vijayendran, Introduction to Integrated electronics (Digital & Analog) - S.Viswanathan, Printers & Publishers Private Ltd, Reprint 2008. Unit-I : Chapter: 4.3 - 4.9, 5.1 - 5.6. Unit-II : Chapter: 6.1 - 6.8, 7.2, 7.5, 8.1 - 8.4. Unit-III: Chapter: 9.2 - 9.6, 10.1 - 10.3.
 B. Ram, Fundamentals Microprocessors and Microcontrollers, Dhanpat Rai Publications (P) Ltd, 8th Edition, Reprint 2016 Unit-IV : Chapter: 3.1, 3.1.1 - 3.1.3, 3.1.5, 3.1.7, 3.1.8, 3.2, 4.3, 4.3, 4.6.1 - 4.6.5 Unit-V : Chapter: 6.7, 6.21, 6.22.1, 6.36, 6.37, 7.2.1, 7.2.2, 7.3.1, 7.3.2, 7.7.1 - 7.7.4, 8.3, 8.6.1, 8.12.2.

Reference Book(s):

1. Fundamentals of Microprocessors and Microcontrollers, B.Ram, Dhanpat Rai Publications, Reprint 2011.

Web Resource(s):

- 1. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf
- 2. https://www.tutorialspoint.com/microprocessor/microprocessor_tutorial.pdf
- 3. http://ce.sharif.edu/courses/86-87/1/ce126/resources/root/8085%20Microprocessor.pdf

Course Outcomes

Upon suc	cessful completion of this course, the student will be able to:	
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	understand the principles and operations of analog and digital instruments	K1, K2
CO2	understand the digital principles and its applications	K3
CO3	learn the principle of combinational and Flip-flops.	K4
CO4	study about the architecture of Intel 8085 Microprocessor	K2
CO5	study about the instructions of Intel 8085 its programming.	K5

Relationship Matrix:

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	4	3	4	1	3	2	3	3	5	3	3.1
CO2	4	3	3	1	3	2	3	4	4	2	2.9
CO3	4	3	3	1	3	2	3	4	4	3	3.0
CO4	3	4	3	1	2	2	3	2	4	4	2.8
CO5	3	4	3	1	2	2	3	2	4	4	2.8
Mean Overall Score										2.9	
Correlation										High	

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Mohamed Saleem Dr. R. Raj Muhamed

SemesterCourse CodeCourse CategoryWeekCreatesCIAESETVI23UPH6DE2BDiscipline Specific Electives II5425751	Somestor	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
VI23UPH6DE2BDiscipline Specific Electives II5425751	Semester	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
Electives-II	VI	23UPH6DE2B	Discipline Specific Electives-II	5	4	25	75	100	

MATERIALS SCIENCE

	SYLLABUS	
Unit	Contents	Hours
I	Crystallography Classification of solids, crystals and non-crystalline materials – lattice points – space lattice – unit cell – *Bravais lattices* – Miller Indices – symmetry elements of a crystalline solid – Bonding of Solids - Ionic - Covalent – Metallic- Hydrogen and Van der Waal.	15
II	Simple crystal structures and imperfections X-ray diffraction and Bragg's law – simple crystal structures –* Laue method* – powder method – Single crystal method- Laue Method-crystal imperfections – Defects in solids	15
III	Electron theory of solids The classical free electron theory – the quantum free electron theory – Brillouin Zones – distinction between metals, insulators and semi conductors –*Drude - Lorentz's classical theory of free electron gas* – Expression for thermal and electrical conductivity - Wiedemann-Franz Law	15
IV	Dielectric and Ferroelectrics Fundamental definitions in dielectrics – *different types of electric polarization* – Dielectric loss – Determination of a Dielectric constant of a dielectric material – Dielectric Breakdown – Properties and Applications of Different types of insulating materials – Properties of Ferroelectric materials	15
V	Material Characterization Techniques *Optical Microscope* – Atomic absorption Spectrometer – UV – Visible spectroscope – Scanning Tunneling Microscope (STM) - X-ray photoelectron spectroscopy (XPS)	15

Text Book(s):

1.Material Science – M.Arumugam, 3rd edition, 2002, ANEH editiom

2. Materials science engineering - V. Raghavan, PHI

3. Modern Physics – Murugesan – S. Chand, 18th Edition 2022

Reference Book(s):

1. Elements of Materials Science and Engineering – Van Valck (3rd edition), Addision-Wesley 2. Textbook of and Nanoscience Nanotechnology

- B S Murty, P Shankar, Baldev Raj, B B Rath, James Murday, Universities Press (India) Private Limited 2013

3. Introduction To Nanoscience And Nenotechnology - Chattopadhyay, Chattopadhyay K. K., banerjee A. N., PHI Learning Pvt. Ltd.. 2009

Web Resource(s):

1.. www.physicstutoruials.org

2. www.sciencelearn.org.nz

3. https://classcentral.com/course/swayam_material science _7927

Indian Institutes of Technology Kanpur and NPTEL via Swayam.

	Course Outcomes						
Upon successful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Understanding the basic of crystals structure and types of bonding	K1					
CO2	Principle and working of X-ray Diffraction of crystal	K2					
CO3	Classical and quantum understanding of electronic structure of atoms	K5					
CO4	Fundamental and classifications of Magnetic and Dielectric materials	K4					
CO5	Basic Characterization Techniques of Nanomaterials	K3					

Course		Programi	me Outco	mes (POs)	Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	2	3	3	2	1	2	2	3	2	1	2.1
CO2	2	3	2	3	2	3	2	1	3	1	2.2
CO3	3	3	3	1	1	2	2	1	3	2	2.1
CO4	2	3	2	3	1	2	2	3	3	1	2.2
CO5	2	2	3	2	2	2	2	2	2	3	2.2
Mean Overall Score									2.16		
Correlation									Medium		

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

DR. A.S. Haja Hameed Dr. V. Kalyanavalli

Semiester Course Code Course Category Week Creans Discipline Specific Image: Course Category Image: Course Category Image: Course Category	Semester				Credits	Marks for Evaluation		
Discipline Specific		Course Coue	Course Category	Week		CIA	ESE	Total
VI 23UPH6DE3A Electives- III 4 4 25	VI	23UPH6DE3A	Discipline Specific Electives- III	4	4	25	75	100

NON CONVENTIONAL ENERGY PHYSICS

SYLLABUS					
Unit	Contents	Hours			
Ι	Energy Resources and the Sun Conventional and Non-Conventional energy resources–Environmental consequence of fossil fuels use–Importance and types of Non-Conventional source of energy–The Sun as source of energy–Radiation Spectrum –*Extraterrestrial and terrestrial radiations*-Spectral power distribution –Measurement of solar radiation- Pyranometer-Pyrheliometer	12			
П	Solar Energy and Photovoltaic system Solar collector–Flat plate collector–Solar pond–Solar water heater–Solar furnace– Box type solar cooker–Solar distillation–Solar greenhouse–Construction of the Solar cell–Solar PV module–Construction of the Solar PV panel– Solar cell V-I characteristics	12			
III	Biomass Energy Photosynthesis–Usable forms of Biomass–*Biomass Resources*–Biomass conversion technologies–Biogas and its composition–Construction and Working of Biogas Plants–Types of Biogas Plants–Fixed Dome Type–Floating Type– Benefits of Biogas	12			
IV	Wind Energy Origin of winds–Power in wind–Types of windmills–Horizontal axis wind turbine (HAWT)–Rotors of HAWT –Vertical axis wind turbine (VAWT)–Rotors of VAWT–Comparison of HAWT and VAWT–Wind energy storage– Environmental impacts of wind turbines	12			
V	Solid Waste Management and Kyoto Protocol Recycling–Bioenergy conversion–Key issues–Waste Recovery Management Scheme–Advantages and disadvantages–*Tips on Reducing waste and conserving resources*–Sources and Types of Wastes–Recycling of plastics–Plastic Resin identification code–Benefits of plastic recycling–Environmental aspects–Kyoto Protocol mechanism.	12			

Text Book(s):

1. B.H. Khan., Non-Conventional Energy Resources, McGraw-Hill Education, Third Edition

Unit – I: Section 1.15.2,1.10,4.2,4.4,4.6,4.8,4.8.1,4.8.2.

- 2. G.S. Sawhney, Non-conventional Energy Resources, PHI Learning Pvt.Ltd., New Delhi, 2012 Unit–II: Section 3.2, 3.2.2, 3.4, 3.5, 3.7, 3.12, 3.13, 3.15, 4.3.1, 4.3.2, 4.3.3, 4.4, 4.4.1 Unit–III: Section 5.2, 5.3, 5.3.2, 5.5 Unit–IV: Section 6.2, 6.2.1, 6.2.2, 6.4.1, 6.5, 6.5.1, 6.5.2, 6.5.3, 6.5.4, 6.5.5, 6.6, 6.7 Unit–V: Section 14.2, 14.2.1, 14.2.2, 14.3
- Shobh Nath Singh, Non-conventional Energy Resources, Pearson India Education Services Pvt. Ltd, New Delhi, 2016 Unit–III: Section 10.2, 10.4, 10.4.1, 10.4.2, 10.4.3, 10.5 Unit–V: Section 8.1.4, 8.1.5, 8.2, 8.3, 8.4, 8.4.4, 8.5, 8.6, 8.6.1, 8.6.2, 8.6.3,

Reference Book(s):

- 1. Er. R.K. Rajput, Non-conventional Energy Sources and Utilization, S. Chand & Company Pvt.Ltd., New Delhi, Second Edition, 2014
- 2. G.D.Rai, Non-conventional Sources of Energy, Khanna Publishers, New Delhi, Sixth Edition, 2017

Web Resource(s):

- 1. https://www.academia.edu/43197256/Non_Conventional_Energy_Resources
- 2. https://pubhtml5.com/ning/vpeg/
- 3. file:///C:/Users/toshiba/Downloads/Non-
- Conventional%20Energy%20Sources%20and%20Utilisation.pdf

Course Outcomes

Upon successful completion of this course, the student will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)				
CO1	Recognize current and possible future role of non-conventional energy resources	K1&K2				
CO2	List various useful applications of solar energy including heating and generation of mechanical energy	К3				
CO3	Analyse the effect of wind energy generation and use on environment	K4				
CO4	Describe technologies for conversion of raw biomass into useful form of energy	К5				
CO5	List various opportunities of energy saving	K5				

Relationship Matrix:

Course]	Program	ne Outco	mes (POs)	Programme Specific Outcomes (PSOs)					Mean Seere of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	2	3	2	2	2	3	3	3	2	2	2.4
CO2	3	3	2	3	3	2	2	2	3	2	2.5
CO3	2	3	3	2	3	3	3	2	2	2	2.5
CO4	2	2	2	3	3	2	3	3	2	3	2.5
CO5	3	3	3	2	2	2	2	3	3	2	2.5
Mean Overall Score									ll Score	2.48	
Correlation									Medium		

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. S. Shek Dhavud

Mr. S. Mohamed Ibrahim Sulaiman Sait
Semester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
VI	23UPH6DE3B	Discipline Specific Electives- III	4	4	25	75	100	

ASTROPHYSICS

	SYLLABUS	
Unit	Contents	Hours
Ι	SATELLITE LAUNCH VEHICLES Launch vehicles – working – Active Satellite Launch vehicles of ISRO – PSLV – GSLV, LVM3 – Satellite Launch vehicles of ISRO under development	12
Π	THE HEART OF THE SOLAR SYSTEM Vital statistics of the Sun - the solar photosphere - the Fraunhoffer lines - structure of solar atmosphere - the solar interior - Sunspots and solar activity - *other features of the solar activity* - Radio studies of the quiet Sun – Radio radiation of the disturbed Sun	12
III	STELLAR EVOLUTION H-R diagram – birth and death of low mass, intermediate mass and massive stares – Chandrasekar limit – white dwarfs – neutron stars – pulsar – black holes – supernovae	12
IV	OUR HOME AND THE NEAREST NEIGHBOUR EARTH: Gross properties - internal structure - the terrestrial atmosphere - the Earth's magnetic field - motions - Solar terrestrial relations - the Earth in space - atmospheric circulation in the troposphere. MOON: Some basic facts - telescopic studies - internal structure - surface features - Origin of the Moon - the lunar environment - Solar and Lunar eclipses.	12
V	LIFE IN THE UNIVERSE Nature of life on Earth - A survey of objects in the Solar System - Pre Mariner search for life on Mars - Post-Mariner search for life on Mars - Life outside the Solar system - *the search for life in the Universe*.	12

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	Understand the principles and applications of active satellite launch vehicles	K1& K2						
CO2	impart an understanding of the great number of diverse phenomena in the Universe through Physics	К3						
CO3	Analyze stellar evolution and help classify galaxies	K4						
CO4	understand about the life in universe	K4						
CO5	Learn about life in the solar system	K5						

Course]	Programi	me Outco	mes (POs))	Prog	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	2	3	3	2	2	2	2	2	2.4
CO2	2	3	2	3	2	2	2	2	3	2	2.3
CO3	2	2	2	3	3	2	3	3	2	2	2.4
CO4	2	1	2	2	2	2	2	3	2	2	2.0
CO5	3	2	3	2	3	3	2	2	2	2	2.4
Mean Overall Score										2.3	
Correlation										Medium	

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Mohamed Saleem Dr. L. Umaralikhan Allied Physics for B.Sc. Chemistry Allied Physics for B.Sc. Mathematics Allied Physics for B.Sc. Computer Science Allied Physics for B.Sc. Artificial Intelligence and Machine Learning

Allied Physics for B.Sc. Chemistry and B.Sc. Mathematics

Semester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
Ι	23UPH1AC1	Allied – I	5	4	25	75	100	

Course Title

FUNDAMENTALS OF PHYSICS

	SYLLABUS	
Unit	Contents	Hours
I	Elasticity: Hooke's law – Young's modulus, Rigidity modulus & Bulk modulus – Expression for bending moment - determination of Young's modulus by non-uniform bending (Pin and Microscope) - surface tension:- definition –determination of surface tension by drop weight method –Viscosity: co-efficient of viscosity –determination of co-efficient of viscosity by burette method (variable pressure head) – *comparison of viscosities*	15
п	Mechanics: Newton's law of gravitation –Kepler's laws of planetary motion–gravitation contstant- determination of 'G' by Boy's method- friction- laws of friction – centre of gravity - centre of gravity of solid cone and solid hemisphere – meta center – meta centric height – *determination of the metacentric height of a ship*	15
ш	Sound: Simple harmonic motion (SHM) –equation of simple harmonic motion – composition of two SHM's in a straight line – composition of two SHM's at right angles to each other – Lissajou's figures (Basic concept only) –ultrasonic – properties – production by piezo- electric method- *applications of ultrasonics*– reverberation and reverberation time- conditions for a good auditorium	15
IV	Heat: Newton's law of cooling -determination of specific heat capacity of a liquid by cooling – thermal conductivity – co-efficient of thermal conductivity – determination of thermal conductivity of a bad conductor by Lee's disc method – solar constant – * determination of solar constant by Angstrom's Pyrheliometer*-temperature of the sun	15
V	 Diffusion and Osmosis: Diffusion: Diffusion of liquids – Graham's laws of diffusion in liquids –*Ficks' law of diffusion* – analogy between liquid diffusion and heat conduction – experimental determination of coefficient of diffusion. Osmosis: osmosis and osmotic pressure – laws of osmotic pressure -experimental determination of osmotic pressure (Berkeley and Hartley method) 	15

Text Book(s):

R. Murugesan, Properties of matter, S.Chand& Co, reprint (2022)
 Unit – I: Sec: 1.1,1.2,1.15.1.21, 3.1, 3.17, 2.1, 2.5, 2.7
 Unit – III: 11.1, 11.2, 12.1,12.2, 12.4, 11.9, 11.10,11.16, 11.17, 11.21
 Unit – II: Sec: 6.1-6.3, 22.1-22.3, 20.1- 20.3
 R. Murugesan, Properties of matter, S.Chand& Co, 4th Edition, 2005
 Unit – V: Sec: 2.21, 8.1- 8.28
 Brijlal&Subramaniam, Heat & thermodynamics, S.Chand Publications, 7th Edition, 2008.
 Unit – IV: Sec: 4.1- 5.5

Reference Book(s):

BrijLal&Subramaniam,Properties of Matter, S.Chand Publications, 4th edition, 2008.
 MathurD.S, Elements of Properties of Matter ,Eleventh edition, Shyamlal Charitable Trust, New Delhi, 1993.

Web Resource(s):

- 1. <u>https://www.askiitians.com/physics/mechanics/surface-tension.aspx</u>
- 2. https://www.esaral.com/oscillations-class-11-simple-harmonic-motion-notes
- 3. <u>https://www.adda247.com/teaching-jobs-exam/heat-and-temperature/</u>

	Course Outcomes							
Upon suc	cessful completion of this course, the student will be able to:							
CO No.	CO Statement	Cognitive Level (K-Level)						
CO1	understand the basic principles of certain physical properties of the materials around us	K2						
CO2	Applications of different constants associated with different materials	К3						
CO3	analyze viscosity, surface tension, diffusion, osmosis, properties of liquid	K4						
CO4	analyze the centre of gravity of various objects	K4						
CO5	interpret the physical properties of new materials	K5						

Relationship Matrix:

Course	Pro	gramm	e Outco	omes (P	Os)	Progra	Mean Score of				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	2	3	3	2	2	3	3	3	2	2	2.5
CO2	3	3	3	2	2	3	2	1	1	2	2.2
CO3	3	1	3	1	3	2	2	2	2	3	2.2
CO4	3	3	2	3	2	3	3	3	1	3	2.6
CO5	1	3	2	2	2	2	3	3	2	2	2.2
Mean Overall Score										2.34	
Correlation										MEDIUM	

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. C. Hariharan

Semester	Course Code		Course Cotogory	Hours/	Cradita	Marks for Evaluation			
	U	ourse Code	Course Category	Week	Creats	CIA	ESE	Total	
Ι	23	3UPH1AC2P	ALLIED –II	3	2	20	80	100	
Course Ti	tle		PROPERTIES OF MA	ATTER – P	RACTICA	Ĺ			

PROPERTIES OF MATTER – PRACTICAL

List of Experiments:

- 1. Young's Modulus Non Uniform bending (Scale & Telescope)
- 2. Surface tension and interfacial surface tension by drop weight method.
- 3. Potentiometer Low range voltmeter calibration
- 4. Air wedge Thickness of a thin wire.
- 5. Comparison of viscosities by capillary flow method.
- 6. AND, OR and NOT logic gates using discrete components .

Books for reference:

1. M.N. Srinivasan, S. Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons, reprint 2010.

2. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

	Course Outcomes									
Upon suc	cessful completion of this course, the student will be able to:									
CO No.	CO No. CO Statement									
CO1	Recall the basic principles of properties of matter and understand the concepts of bending behaviour beams	K2								
CO2	Make practical skills essential for experimentation.	K3								
CO3	Apply experimental approaches to correlate with physics theory to develop practical understanding.	К3								
CO4	Analyze themselves the concept of heat, optics and acoustics	K4								
CO5	evaluate the ideas required for their higher studies	K5								

Relations	hip Ma	trix:									
Course	Pro	gramm	e Outco	omes (P	Os)	Progra	(PSOs)	Mean Score of			
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	3	3	2	2	2	1	2	2	2	2.2
CO2	2	3	2	3	2	2	2	2	3	2	2.3
CO3	2	2	2	3	3	2	3	3	2	2	2.4
CO4	2	1	2	2	2	2	2	3	2	2	2.0
CO5	2	3	3	2	3	3	2	1	2	2	2.3
								Me	an Overa	all Score	2.22
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥2.5	High

Course Coordinator: Dr. S. Abbas Manthiri

Somester	Course Code	Course Cotogony	Hours/	Credita	Marks for Evaluation				
Semester	bemester Course Code	Course Calegory	Week	Creats	CIA	ESE	Total		
II	23UPH2AC3	ALLIED – III	4	4	25	75	100		

ESSENTIALS OF PHYSICS

	SYLLABUS						
Unit	Contents	Hours					
Ι	Spherical Aberration in a lens – Methods of minimizing Spherical Aberration – Interference– Air-wedge – Thickness of a thin wire (Theory and Experiment) – Newton's rings – Radius of curvature of the lens-Diffraction-Determination of wavelength of light using grating- *Polarization* –Specific Rotatory Power- Laurent's Half Shade Polarimeter						
п	ELECTRICITY Coulomb's law – Gauss law - Principle of capacitor –Energy stored in a charged capacitor – Loss of energy due to sharing of charges – *Kirchhoff's laws* – Application of Kirchhoff's laws to Wheatstone bridge – Carey Foster bridge – Determination of specific resistance – Potentiometer - Calibration of low range voltmeter and ammeter	12					
III	ATOMIC AND NUCLEAR PHYSICS Vector atom model – Quantum numbers – Coupling schemes – The Pauli's Exclusion Principle – Zeeman Effect – Experimental arrangement for normal Zeeman effect – Liquid drop model –Construction and working of an Ionization chamber and Geiger Muller Counter – *Nuclear fission* – Energy released in fission –Nuclear fusion	12					
IV	ELECTRONICS Formation of P-N Junction Diode – Forward and Reverse biasing of a Junction diode – V-I Characteristics of a Junction Diode – *Junction diode as bridge rectifier* – Zener diode – V-I Characteristics of a Zener Diode – Construction and Working of a transistor – Characteristics of a transistor in Common Emitter (CE) and Common Base (CB) configurations	12					
V	NUMBER SYSTEMS AND LOGIC CIRCUITS Conversion between Decimal, Binary, Octal and Hexadecimal number systems – *The basic logic gates (AND, OR, NOT) using discrete components – NAND and NOR as universal gates – The Exclusive OR gate* – Laws of Boolean algebra – De- Morgan's theorems – Half Adder– Full Adder	12					

..... Self Study

Text Books:

- 1. R. Murugeshan, KiruthigaSivaprasath,Optics and Spectroscopy, S. Chand & Company PVT. Ltd, New Delhi, Reprint, 2016.
- Unit-I:Section1.16 1.7, 2.1, 2.7-2.9, 3.17, 4.19, 4.20
- Unit VI: Section 5.3 5.6
- 2. R. Murugeshan, Electricity and Magnetism, S. Chand & Company PVT. Ltd, New Delhi, Tenth Edition, 2017.

Unit–II: Section 1.2, 2.2, 4.1, 4.9, 4.11, 6.6 – 6.8R. Murugeshan, KiruthigaSivaprasath, Modern Physics, S. Chand & Company PVT. Ltd, New Delhi, Eighteenth Edition, 2016.

Unit –III: Section 4.12 – 4.23, 17.10, 18.3, 18.6, 22.1, 22.6 – 22.6.1

Unit –IV: Section 33.1 – 33.2.1, 33.5.3, 34.1, 35.1 – 35.3

Unit – V: Section 41.1 – 41.15

 N. Subrahmanyam, Brijlal and M.N. Avadhanulu, A Textbook of Optics, S. Chand & Company PVT. Ltd, New Delhi, Twenty Fourth Edition, 2015. Unit – VI: Section 22.8, 22.14 – 22.19

Reference Books :

1. Arthur Beiser, Concepts of Modern Physics, McGraw Hill, Fifth edition, 2002.

2. V.K.Mehta, RohitMehta, Principles of Electronics, S.ChandPublications, Reprint 2016

Web Resources:

- 1. <u>https://www.classcentral.com/course/edx-electricity-and-magnetism-part-1-3032</u>
- 2. <u>https://www.electronics-tutorials.ws/</u>
- 3. <u>https://www.nuclear-power.net/nuclear-power/reactor-physics/atomic-nuclear-physics/</u>

	Course Outcomes								
Upon suc	Upon successful completion of this course, the student will be able to:								
CO No.	CO No. CO Statement								
CO1	Recall the basic principles and contemporary concepts on various fields on physics like optics, electrostatics, atomic and nuclear physics	K1							
CO2	Understand the basic ideas of geometric optics	K2							
CO3	Construct digital circuits for simple real world problems	K3							
CO4	List the applications of electronics in modern gadgets	K4							
CO5	Explain the fundamental concepts of electricity	K5							

Course OutcomesProgramme Outcomes (POs)				Progr	Programme Specific Outcomes (PSOs)						
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	01 COS
CO1	2	2	1	3	2	2	3	1	2	3	2.1
CO2	2	3	1	2	3	2	3	2	3	2	2.3
CO3	2	3	2	3	1	1	3	2	1	3	2.1
CO4	3	2	3	1	1	3	2	2	2	3	2.2
CO5	3	2	3	3	2	3	2	2	3	1	2.4
								Me	an Overa	all Score	2.22
									Cor	relation	MEDIUM

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. S. Shek Dhavud Dr.P. Revathi

Somester	Course Code	Course Cotogony	Hours/	Cradita	Marks	for Eva	luation
Semester	Course Coue	Course Category	Week	Creats	CIA	ESE	Total
П	23UPH2AC4P	ALLIED – IV	3	2	20	80	100

OPTICAL, THERMAL AND ELECTRICITY - PRACTICAL

List of Experiments:

- 1. Young's modulus Cantilever depression method
- 2. Potentiometer Ammeter calibration.
- 3. Compound Pendulum: Determination of the radius of Gyration
- 4. Comparison of radii: Capillary flow method.
- 5. Sonometer Verification of transverse laws of vibration (I & II Law)
- 6. Meter bridge resistance.
- 7. Verification of De Morgan's theorems using ICs.
- 8. Determination of the resistance of a material using post office box.

Books for Reference:

- 1. M.N. Srinivasan, S. Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons, reprint 2010.
- C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

	Course Outcomes								
Upon suc	Upon successful completion of this course, the student will be able to:								
CO No. CO Statement									
CO1	Recall the basic principles of properties of matter and underlying the concepts of bending behaviour beams	K2							
CO2	Make practical skills essential for experimentation.	К3							
CO3	Apply experimental approaches to correlate with physics theory to develop practical understanding.	К3							
CO4	Analyze the concepts of heat and acoustics and understood the measurements of some physical quantities through heat and electricity experiments	K4							
CO5	evaluate the circuit construction in the electronics	K5							

Course	Pro	gramm	e Outco	omes (P	Os)	Progra	Programme Specific Outcomes (PSOs)					
Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Score of COs	
CO1	3	3	3	2	2	2	1	2	2	2	2.2	
CO2	2	3	2	3	2	2	2	2	3	2	2.3	
CO3	2	2	2	3	3	2	3	3	2	2	2.4	
CO4	2	1	2	2	2	2	2	3	2	2	2.0	
CO5	2	3	3	2	3	3	2	1	2	2	2.3	
								Me	an Overa	all Score	2.22	
									Cor	relation	Medium	

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Mr. S. Mohamed Ibrahim Sulaiman Sait

Allied Physics for B.Sc. Computer Science

Semester	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creats	CIA	ESE	Total	
III	23UPH3AC5	ALLIED-V	4	4	25	75	100	

Course Title

ELECTRONIC CIRCUITS AND DEVICES

	SYLLABUS	
Unit	Contents	Hours
I	Semiconductor Physics Intrinsic & Extrinsic Semiconductors – n-Type and p-Type semiconductors- Formation of PN Junction Diode -V-I characteristics –*Zener diode* –V-I characteristics – Zener diode voltage regulator -Rectifiers – Half wave & Full wave bridge rectifier	12
п	Transistors Transistor action: npn & pnp–Transistor characteristics CE and CB configuration – α and β relationship-Amplifier – Single Stage RC Coupled Amplifier –Principle of feedback –Types of feedback –Barkhausen criterion – Oscillator – Hartley oscillator.	12
ш	Special Devices FET – Construction – n channel and p channel – FET Characteristics – FET parameters – FET amplifier (CS configuration) –Photo diode –Construction- Characteristics - LED – Construction- Characteristics- *LCD*- Construction - Seven segment display.	12
IV	Optical Fiber &Optoelectronic devices Types of fibers- Semiconductor laser source for optical communication-Block diagram of fiber optic communication system -Construction and Characteristics of Optoelectronic devices: Photoconductive Sensors – Photoconductive Cell, Applications, Photodiode, Phototransistor –Solar Cell	12
v	Operational Amplifier: Ideal Op-amp – Parameters – Inverting and Non-Inverting Operational Amplifiers – Adder – Subtractor – Sign changer – Scale changer – Op-amp Differentiator -Op-amp Integrator.	12
Text Bo	pok(s):	
	 V.K. Mehta & Rohit Metha, Principle of Electronics, PH Printers & Publishers Pri Reprint 2008. P.K.Palanisamy, Semiconductor Physics And Opto-Electronics, Scitech Pub (India).Pvt.Ltd, 2011 S Salivahanan, N Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Edu Pvt Limited, Chennai, Fourth Edition, 2019. 	vate Ltd, blications acation
Referen	ace Book(s):	
1. Muru 2. Appli 3. D. Ro Fourt	gesan, Kiruththiga SivaPrasath, Modern Physics, S. Chand & Co Thirteenth Edition, ed Physics – Dr. M. Arumugam – Anuradha Agencies, 2011 by Choudhury and Shail B. Jain, Linear Integrated Circuits, New Age International Pu h Edition, 2015	2016 Iblishers,
Web R	esource(s):	
1. 1.	https://swayam.gov.in/nd1_noc19_ee36/preview	

	Course Outcomes					
Upon suc	Upon successful completion of this course, the student will be able to:					
CO No.	CO No. CO Statement					
CO1	Remembering some basic semiconductor devices, means of identifying them from their coding schemes and finding out their terminals	K1				
CO2	understanding a knowledge of the principles and functioning of these semiconductor devices and their individual or standalone characteristic features using mathematical and graphical analysis so that they may be helpful in predicting their behavior and functioning when incorporated in circuitry	K2				
CO3	Applying the essential techniques of circuit design employing these devices, the analysis of the circuits so constructed and the means of evaluating their parameters and performance using mathematical and graphical tools	К3				
CO4	Analyzing a sound knowledge of the essential theoretical features and concepts such as modulation and demodulation, regulated power supplies, amplification, switching operations so that they may be useful not only for higher studies but also in providing theoretical framework for possible applications beneficial to the society	K4				
CO5	Evaluating technical skills to wire the circuits and to trouble shoot them as well as to construct of new circuits for specific tasks thereby helping them to become entrepreneurs	К5				

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
C01	2	3	3	2	2	3	2	3	2	3	2.5
CO2	3	3	2	2	2	3	2	3	2	2	2.4
CO3	3	2	3	2	3	3	2	3	2	3	2.6
CO4	2	3	2	3	2	3	2	3	3	3	2.6
CO5	2	3	2	2	2	2	3	3	3	3	2.5
Mean Overall Score										2.52	
Correlation									High		

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Mohamed Saleem Dr. S. Abbas Manthiri

Compostor	Course Code		Course Cotogowy	Hours/	Credita	Marks for Evaluation			
Semester	U	ourse Code	Course Category	Week	Creans	CIA	ESE	Total	
III	23	UPH3AC6P	ALLIED-VI	3	2	20	80	100	
Course Title			ELECTRONIC	CS - PRA	ACTICAL				

S.No.	List of Experiments						
1	Junction diode characteristics						
2	Wave shaping Circuits (Positive & Negative Clippers & Clampers)						
3	Op-Amp – Adder and Subtractor						
4	Basic Logic gates – Discrete Components						
5	Zener controlled rectifier						
6	Zener diode characteristics						
7	Op-Amp – Differentiator and Integrator						
8	NAND as universal gates						

Text Book(s):

1. M.N. Srinivasan, S.Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons, Reprint 2010.

Reference Book(s):

1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

Web Resource(s):

- 1. www.physicstutoruials.org
- 2. www.sciencelearn.org.nz

Course Outcomes						
Upon suc	Upon successful completion of this course, the student will be able to:					
CO No.	CO Statement	Cognitive Level (K-Level)				
CO1	Understand the basic principles of Electricity and Magnetism	K1				
CO2	Acquire the experimental skills.	K1				
CO3	Understand the characteristics of the semiconductor diodes and operational amplifiers.	К2				
CO4	Analyzing the practical applications of Electricity ,Magnetism and Electronics in their day to day life.	K4				
CO5	Evaluating the basic requirements for their higher studies.	K5				

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	1	2	3	2	2	2	3	1	2.1
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	2	2	2	2	2	2	2	3	2	2.2
CO4	3	2	3	2	1	2	2	2	3	3	2.3
CO5	3	2	3	3	2	2	2	2	3	2	2.4
Mean Overall Score										2.26	
Correlation									Medium		

Mean Overall Score	Correlation				
< 1.5	Low				
\geq 1.5 and < 2.5	Medium				
≥ 2.5	High				

Course Coordinators:

Dr. S. Abbas Manthiri

Dr. C. Hariharan

Semester	Course Code	Course Cotogory	Hours/	Credita	Marks for Evaluation			
		Course Category	Week	Creans	CIA	ESE	Total	
IV	23UPH4AC7	ALLIED-VII	5	4	25	75	100	

DIGITAL ELECTRONICS AND MICROPROCESSOR

	SYLLABUS	
Unit	Contents	Hours
I	Number Systems: Introduction to decimal, binary, octal & hexadecimal number systems – Interconversions –binary arithmetic operations – Addition, Subtraction, Multiplication and Division – 1's & 2's complements - signed binary numbers - BCD code - *Gray code – ASCII code*	15
п	Logic gates and Boolean expressions: *Logic gates* –AND, OR, NOT, NAND, NOR, EX-OR, and EX-NOR – Universality of NAND and NOR gates- Sum of Products (SOP) - Product of Sum (POS) Laws of Boolean algebra –- simplification of Boolean expressions using Boolean laws - De-Morgan's theorems-Karnaugh map:Minterms – 2, 3 & 4 variables – Don't care conditions.	15
III	Arithmetic, Combinational and Sequential circuits: *Half adder and full adder* – half subtractor and full subtractor–multiplexer – demultiplexer- Flip flops – RS, Clocked RS, J-K, J-K master slave and D flip flop	15
IV	Microprocessor Architecture: Intel 8085 architecture – Pin configuration – *Opcode – Operands – Instruction Word size* – Instruction Cycle – Fetch Operation – Execution Operation – Machine Cycle and State – Timing diagram – opcode fetch cycle– memory read – I/O read – memory write –I/O write	15
V	Intel 8085 Assembly language: Addressing modes – Intel 8085 instructions – data transfer, arithmetic, branch, stack, I/O and machine control group – stack – addition, subtraction, multiplication and division of 8-bit numbers – sum of the series of 8-bit numbers – sorting of numbers in ascending and descending order – block data transfer	15

.... Self Study

Text Book(s):

1.	V.Vijayendran, S.Viswanathan, Introduction	n to Integrated electronics(Digital & Analog) PH				
	Printers & Publishers Private Ltd, Reprint 2	008.					
	Unit-I : 1.1 – 4.20.	Unit-II : 5.1 – 6.23.					
	Unit-III: 7.1 – 8.18, 9.1 – 10.19, 16.1 – 16.13.						

2. P.S.Manoharan, Microprocessors & Microcontrollers –P.S.Manoharan, Charulatha Publications, 2011

Unit-IV : 1.68 – 1.82.

3. B.Ram, Fundamentals of Microprocessors and Microcontrollers, B.Ram, Dhanpat Rai Publications, Reprint 2011.

Unit-V: 1.6-1.86, 6.22 – 6.38.

Reference Book(s):

- 1. V.Vijayendran, Fundamentals of Microprocessor 8085, S.Viswanathan, Printers & Publishers Private Ltd.
- 2. P.S.Manoharan, Microprocessors & Microcontrollers –P.S.Manoharan, Charulatha Publications, 2011

Web Resource(s):

1. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf 2.

2.https://www.tutorialspoint.com/microprocessor/microprocessor_tutorial.pdf

3.http://ce.sharif.edu/courses/86-87/1/ce126/resources/root/8085%20Microprocessor.pdf

	Course Outcomes						
Upon suc	cessful completion of this course, the student will be able to:						
CO No.	CO Statement	Cognitive Level (K-Level)					
CO1	Remember the principles and operations of analog and digital instruments	K1					
CO2	understand the digital principles and its applications	K2					
CO3	Apply the principle of combinational and Flip-flops	К3					
CO4	Analyze about the architecture of Intel 8085 Microprocessor	K4					
CO5	Evaluate the assembly language programs of 8085 microprocessor using trainer kit	К5					

Course	Programme Outcomes (POs)					Prog	Mean Score				
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
CO1	2	3	3	2	2	3	2	3	2	3	2.5
CO2	3	3	2	2	2	3	2	3	2	2	2.4
CO3	3	2	3	2	3	3	2	3	2	3	2.6
CO4	2	3	2	3	2	3	2	3	2	3	2.5
CO5	2	3	2	2	2	2	3	3	2	2	2.3
Mean Overall Score										2.46	
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

- Dr. A. Mohamed Saleem
- Dr. S. Abbas Manthiri

Somester	Course Code	Course Cotogony	Hours/	Cradita	Marks for Evaluation			
Semester	Course Code	Course Category	Week	Creats	CIA	ESE	Total	
IV	23UPH4AC8P	ALLIED-VIII	3	2	20	80	100	
			-					

DIGITAL AND MICROPROCESSOR - PRACTICAL

S.No.	List of Experiments
1	Logic Gates AND, OR, NOT, NAND, NOR EX-OR and EX-NOR using ICs
2	Half adder and Full adder using AND, OR and EXOR gates
3	Half subtractor and Full subtractor using AND, OR, NOT and EX-OR gates
4	RS and J-K flip flops
5	8-bit addition, Subtraction, Multiplication and Division
6	Sum of the series of 8-bit numbers
7	Sorting of numbers in ascending and descending order
8	Block data transfer using microprocessor 8085.

Text Book(s):

1. M.N. Srinivasan, S.Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons, Reprint 2010.

Reference Book(s):

1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

Web Resource(s):

1. www.physicstutoruials.org

2. www.sciencelearn.org.nz

Course Outcomes						
Upon suc	cessful completion of this course, the student will be able to:					
CO No.	CO Statement	Cognitive Level (K-Level)				
CO1	Remember the basic principles of Electricity, Heat and Electronics.	K1				
CO2	Understand the experimental skills.	K2				
CO3	Understand the characteristics of the semiconductor diodes, transistors and operational amplifiers.	K2				
CO4	Analyze the Electricity and Electronics circuit construction.	K4				
CO5	Evaluate the basic requirements for their higher studies.	К5				

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
CO1	3	2	1	2	3	2	2	2	3	2	2.2
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	3	2	2	2	2	2	2	3	2	2.4
CO4	3	2	3	2	1	2	2	2	2	3	2.2
CO5	3	2	3	3	2	2	2	2	3	2	2.4
Mean Overall Score									2.3		
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Mohamed Saleem

Dr. S. Abbas Manthiri

Allied Physics for B.Sc. Artificial Intelligence and Machine Learning

SemesterCourse CodeCourse CategoryWeekCreatisCIAESETIII24UPH3AC5ALLIED, V4425751	Somester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
III 24 IIPH 3AC5 ALLIED V 4 4 25 75 1	Semester	Course Code	Course Category	Week	Creatis	CIA	ESE	Total	
	III	24UPH3AC5	ALLIED - V	4	4	25	75	100	

Course Title

ELECTRONIC CIRCUITS AND DEVICES

	SYLLABUS	
Unit	Contents	Hours
I	Semiconductor Physics Intrinsic & Extrinsic Semiconductors – n-Type and p-Type semiconductors- Formation of PN Junction Diode -V-I characteristics –*Zener diode* –V-I characteristics – Zener diode voltage regulator -Rectifiers – Half wave & Full wave bridge rectifier	12
II	Transistors Transistor action: npn & pnp–Transistor characteristics CE and CB configuration $-\alpha$ and β relationship-Amplifier – Single Stage RC Coupled Amplifier –Principle of feedback –Types of feedback –Barkhausen criterion – Oscillator – Hartley oscillator.	12
ш	Special Devices FET – Construction – n channel and p channel – FET Characteristics – FET parameters – FET amplifier (CS configuration) –Photo diode –Construction- Characteristics - LED – Construction- Characteristics- *LCD*- Construction - Seven segment display.	12
IV	Optical Fiber & Optoelectronic devices Types of fibers- Semiconductor laser source for optical communication-Block diagram of fiber optic communication system -Construction and Characteristics of Optoelectronic devices: Photoconductive Sensors – Photoconductive Cell, Applications, Photodiode, Phototransistor –Solar Cell	12
V	Operational Amplifier: Ideal Op-amp – Parameters – Inverting and Non-Inverting Operational Amplifiers – Adder – Subtractor – Sign changer – Scale changer – Op-amp Differentiator -Op-amp Integrator.	12

..... Self Study

Text Book(s):

- 4. V.K. Mehta & Rohit Metha, Principle of Electronics, PH Printers & Publishers Private Ltd, Reprint 2008.
- 5. P.K.Palanisamy, Semiconductor Physics And Opto-Electronics , Scitech Publications (India).Pvt.Ltd, 2011
- 6. S Salivahanan, N Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Education Pvt Limited, Chennai, Fourth Edition, 2019.

Reference Book(s):

1. Murugesan, Kiruththiga SivaPrasath ,Modern Physics,S. Chand & Co Thirteenth Edition, 2016

- 2. Applied Physics Dr. M. Arumugam Anuradha Agencies, 2011
- 3. D. Roy Choudhury and Shail B. Jain, Linear Integrated Circuits, New Age International Publishers, Fourth Edition, 2015

Web Resource(s):

2. 1. https://swayam.gov.in/nd1_noc19_ee36/preview

	Course Outcomes	
Upon suc	cessful completion of this course, the student will be able to:	
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Remembering some basic semiconductor devices, means of identifying them from their coding schemes and finding out their terminals	K1
CO2	understanding a knowledge of the principles and functioning of these semiconductor devices and their individual or standalone characteristic features using mathematical and graphical analysis so that they may be helpful in predicting their behavior and functioning when incorporated in circuitry	К2
CO3	Applying the essential techniques of circuit design employing these devices, the analysis of the circuits so constructed and the means of evaluating their parameters and performance using mathematical and graphical tools	К3
CO4	Analyzing a sound knowledge of the essential theoretical features and concepts such as modulation and demodulation, regulated power supplies, amplification, switching operations so that they may be useful not only for higher studies but also in providing theoretical framework for possible applications beneficial to the society	K4
CO5	Evaluating technical skills to wire the circuits and to trouble shoot them as well as to construct of new circuits for specific tasks thereby helping them to become entrepreneurs	K5

Outcomes (COs) PO1 PO2 PO3 PO4 PO5 PS01 PS02 PS03 PS04 PS05 of COs CO1 2 3 3 2 2 3 2 3 2 3 2.5 CO2 3 3 2 2 2 3 2 3 2.5 CO2 3 3 2 2 3 2 3 2 2 2.4 CO3 3 2 3 2 3 2 3 2.6 CO4 2 3 2 3 2 3 3 3 2.6 CO5 2 3 2 2 2 3 3 3 3 2.5 Mean Overall Score Z.52 Mean Overall Score Z.52	Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score
CO1 2 3 3 2 2 3 2 3 2.5 CO2 3 3 2 2 2 3 2 3 2 2.4 CO3 3 2 3 2 3 3 2 3 2.4 CO3 3 2 3 2 3 2 3 2.4 CO3 3 2 3 2 3 2 3 2.6 CO4 2 3 2 3 2 3 3 3 2.6 Co5 2 3 2 2 2 3 3 3 2.6 Mean Overall Score Z.52 Mean Overall Score Z.52 Mean Overall Score Z.52	(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
CO2 3 3 2 2 2 3 2 3 2 2.4 CO3 3 2 3 2 3 3 2 3 2.4 CO3 3 2 3 2 3 2 3 2.4 CO3 3 2 3 2 3 2 3 2.6 CO4 2 3 2 3 2 3 3 3 2.6 CO5 2 3 2 2 2 3 3 3 2.6 Mean Overall Score Z.52 Mean Overall Score Z.52 Correlation High	CO1	2	3	3	2	2	3	2	3	2	3	2.5
CO3 3 2 3 2 3 3 2 3 2 3 2.6 CO4 2 3 2 3 2 3 2 3 3 2.6 CO4 2 3 2 3 2 3 2 3 3 2.6 CO5 2 3 2 2 2 2 3 3 3 2.6 Co5 2 3 2 2 2 2 3 3 3 2.5 Mean Overall Score 2.52 Correlation High	CO2	3	3	2	2	2	3	2	3	2	2	2.4
CO4 2 3 2 3 2 3 2 3 3 2.6 CO5 2 3 2 2 2 2 3 3 3 2.6 CO5 2 3 2 2 2 2 3 3 3 2.5 Mean Overall Score 2.52 Correlation High	CO3	3	2	3	2	3	3	2	3	2	3	2.6
CO5 2 3 2 2 2 2 3 3 3 2.5 Mean Overall Score 2.52 Correlation High	CO4	2	3	2	3	2	3	2	3	3	3	2.6
Mean Overall Score 2.52 Correlation High	CO5	2	3	2	2	2	2	3	3	3	3	2.5
Correlation High									Me	an Overa	ll Score	2.52
										Cor	relation	High

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Mohamed Saleem

Dr. S. Abbas Manthiri

Somestan	Co	una Cada	Course Cotogowy	Hours/	Cuadita	Marks for Evaluation			
Semester	CO	urse Code	Course Category	Week	Creans	CIA	ESE	Total	
III	240	JPH3AC6P	ALLIED - VI	3	2	20	80	100	
Course Title			ELECTRONIC	CS – PRA	ACTICAL	,			

ELECIKONICS PRACTICAL

S.No.	List of Experiments						
1	Junction diode characteristics						
2	Wave shaping Circuits (Positive & Negative Clippers & Clampers)						
3	Op-Amp – Adder and Subtractor						
4	Basic Logic gates – Discrete Components						
5	Zener controlled rectifier						
6	Zener diode characteristics						
7	Op-Amp – Differentiator and Integrator						
8	NAND as universal gates						

Text Book(s):

1. M.N. Srinivasan, S.Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand & Sons, Reprint 2010.

Reference Book(s):

1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt, Ltd, First edition, 2007.

Web Resource(s):

- 1. www.physicstutoruials.org
- 2. www.sciencelearn.org.nz

	Course Outcomes								
Upon suc	Upon successful completion of this course, the student will be able to:								
CO No.	CO Statement	Cognitive Level (K-Level)							
CO1	Understand the basic principles of Electricity and Magnetism	K1							
CO2	Acquire the experimental skills.	K1							
CO3	Understand the characteristics of the semiconductor diodes and operational amplifiers.	K2							
CO4	Analyzing the practical applications of Electricity ,Magnetism and Electronics in their day to day life.	K4							
CO5	Evaluating the basic requirements for their higher studies.	K5							

Course	Course Programme Outcomes (POs)				Prog	Mean Score of					
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	COs
CO1	3	2	1	2	3	2	2	2	3	1	2.1
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	2	2	2	2	2	2	2	3	2	2.2
CO4	3	2	3	2	1	2	2	2	3	3	2.3
CO5	3	2	3	3	2	2	2	2	3	2	2.4
								Me	an Overa	ll Score	2.26
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. S. Abbas Manthiri

Dr. C. Hariharan

Semester	Course Code	Course Cotogory	Hours/	Cradita	Marks for Evaluation			
	Course Coue	Course Category	Week	Creans	CIA	ESE	Total	
IV	24UPH4AC7	ALLIED - VII	5	4	25	75	100	

DIGITAL ELECTRONICS AND MICROPROCESSOR

	SYLLABUS	
Unit	Contents	Hours
I	Number Systems: Introduction to decimal, binary, octal & hexadecimal number systems – Interconversions –binary arithmetic operations – Addition, Subtraction, Multiplication and Division – 1's & 2's complements - signed binary numbers - BCD code - *Gray code – ASCII code*	15
п	Logic gates and Boolean expressions: *Logic gates* –AND, OR, NOT, NAND, NOR, EX-OR, and EX-NOR – Universality of NAND and NOR gates- Sum of Products (SOP) - Product of Sum (POS) Laws of Boolean algebra –- simplification of Boolean expressions using Boolean laws - De-Morgan's theorems-Karnaugh map:Minterms – 2, 3 & 4 variables – Don't care conditions.	15
III	Arithmetic, Combinational and Sequential circuits: *Half adder and full adder* – half subtractor and full subtractor–multiplexer – demultiplexer- Flip flops – RS, Clocked RS, J-K, J-K master slave and D flip flop	15
IV	Microprocessor Architecture: Intel 8085 architecture – Pin configuration – *Opcode – Operands – Instruction Word size* – Instruction Cycle – Fetch Operation – Execution Operation – Machine Cycle and State – Timing diagram – opcode fetch cycle– memory read – I/O read – memory write –I/O write	15
V	Intel 8085 Assembly language: Addressing modes – Intel 8085 instructions – data transfer, arithmetic, branch, stack, I/O and machine control group – stack – addition, subtraction, multiplication and division of 8-bit numbers – sum of the series of 8-bit numbers – sorting of numbers in ascending and descending order – block data transfer	15

.... Self Study

Text Book(s):

1. V.Vijayendran, S.Viswanathan, Introduction to Integrated electronics(Digital & Analog) PH Printers & Publishers Private Ltd, Reprint 2008.

Unit-I : 1.1 – 4.20. Unit-II : 5.1 – 6.23.

Unit-III: 7.1 – 8.18, 9.1 – 10.19, 16.1 – 16.13.

2. P.S.Manoharan, Microprocessors & Microcontrollers –P.S.Manoharan, Charulatha Publications, 2011

Unit-IV : 1.68 – 1.82.

3. B.Ram, Fundamentals of Microprocessors and Microcontrollers, B.Ram, Dhanpat Rai Publications, Reprint 2011.

Unit-V : 1.6-1.86 ,6.22 – 6.38.

Reference Book(s):

- 1. V.Vijayendran, Fundamentals of Microprocessor 8085, S.Viswanathan, Printers & Publishers Private Ltd.
- 2. P.S.Manoharan, Microprocessors & Microcontrollers –P.S.Manoharan, Charulatha Publications, 2011

Web Resource(s):

1. https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf 2.

2.https://www.tutorialspoint.com/microprocessor/microprocessor_tutorial.pdf

3.http://ce.sharif.edu/courses/86-87/1/ce126/resources/root/8085%20Microprocessor.pdf

	Course Outcomes								
Upon suc	Upon successful completion of this course, the student will be able to:								
CO No.	CO Statement	Cognitive Level (K-Level)							
CO1	Remember the principles and operations of analog and digital instruments	K1							
CO2	understand the digital principles and its applications	K2							
CO3	Apply the principle of combinational and Flip-flops	K3							
CO4	Analyze about the architecture of Intel 8085 Microprocessor	K4							
CO5	Evaluate the assembly language programs of 8085 microprocessor using trainer kit	K5							

Course	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score
(COs)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
CO1	2	3	3	2	2	3	2	3	2	3	2.5
CO2	3	3	2	2	2	3	2	3	2	2	2.4
CO3	3	2	3	2	3	3	2	3	2	3	2.6
CO4	2	3	2	3	2	3	2	3	2	3	2.5
CO5	2	3	2	2	2	2	3	3	2	2	2.3
								Me	an Overa	Il Score	2.46
									Cor	relation	Medium

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Mohamed Saleem

Dr. S. Abbas Manthiri

Semester	Course Code	Course Cotogony	Hours/	Credits	Marks for Evaluation		
		Course Category	Week		CIA	ESE	Total
IV	24UPH4AC8P	ALLIED - VIII	3	2	20	80	100
	·			•			

DIGITAL AND MICROPROCESSOR - PRACTICAL

S.No.	List of Experiments				
1	Logic Gates AND, OR, NOT, NAND, NOR EX-OR and EX-NOR using ICs				
2	Half adder and Full adder using AND, OR and EXOR gates				
3	Half subtractor and Full subtractor using AND,OR, NOT and EX-OR gates				
4	RS and J-K flip flops				
5	8-bit addition, Subtraction, Multiplication and Division				
6	Sum of the series of 8-bit numbers				
7	Sorting of numbers in ascending and descending order				
8	Block data transfer using microprocessor 8085.				

Text Book(s):

1. M.N. Srinivasan, S.Balasubramaniyan, R. Ranganathan, A text book of Practical Physics, S.Chand&Sons, Reprint 2010.

Reference Book(s):

1. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practical physics and electronics, S. Viswanathan, Pvt,Ltd, First edition,2007.

Web Resource(s):

1. www.physicstutoruials.org

2. www.sciencelearn.org.nz

Course Outcomes						
Upon successful completion of this course, the student will be able to:						
CO No.	CO No. CO Statement					
CO1	Remember the basic principles of Electricity, Heat and Electronics.	K1				
CO2	Understand the experimental skills.	K2				
CO3	Understand the characteristics of the semiconductor diodes, transistors and operational amplifiers.	K2				
CO4	Analyze the Electricity and Electronics circuit construction.	K4				
CO5	5 Evaluate the basic requirements for their higher studies.					

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	of COs
CO1	3	2	1	2	3	2	2	2	3	2	2.2
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	3	2	2	2	2	2	2	3	2	2.4
CO4	3	2	3	2	1	2	2	2	2	3	2.2
CO5	3	2	3	3	2	2	2	2	3	2	2.4
Mean Overall Score								ll Score	2.3		
Correlation								Medium			

Mean Overall Score	Correlation
< 1.5	Low
\geq 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinators:

Dr. A. Mohamed Saleem

Dr. S. Abbas Manthiri