A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS),

NAGAPATTINAM

(Accredited With 'A' Grade By NAAC 3rd Cycle)
(Affiliated to Bharathidasan University, Tiruchirappalli)

PG AND RESEARCH DEPARTMENT OF PHYSICS

SYLLABUS

B.Sc. PHYSICS

(2021-2024 Batch)

A.D.M COLLEGE FOR WOMEN (AUTONOMOUS), Nagapattinam

UG Programme - B.Sc., Physics
(For the candidates admitted from 2021 – 2022 onwards)

Bloom's Taxonomy Based Assessment Pattern

Knowledge Level

K1– Acquire/ Remember	**K2**–Understanding	**K3**–Apply	**K4**– Analyze	**K5**–Evaluate	**K6** – Create

Part I, II and III

Theory (External + Internal = 75 + 25 = 100 marks)

External/Internal					
Knowledge Level	**Section**	**Marks**	**Hrs**	**Total**	**Passing Mark**
K1-K3	A(Answer all)	10 ×2 =20	3	75	30
K3-K6	B(Either or pattern)	5 ×5 = 25			
K3-K6	C(Answer 3 out of5)	3 ×10 =30			

PG AND RESEARCH DEPARTMENT OF PHYSICS
B.Sc. PHYSICS COURSE STRUCTURE UNDER CBCS (2021-2024 Batch)
OBE ELEMENTS

Programme Educational Objectives (PEO):

PEO 1:	To acquire and maintain standards of achievement in terms of knowledge, understanding and skills in Physics and their applications to the natural phenomenon aswell as the development of scientific attitudes.
PEO 2:	Promote Analytical Thinking and research skills in the minds of students To acquire fundamental/systematic or coherent understanding of the academic field of Physics and its different learning areas with applications in basic Physics.
PEO 3:	Mould the students to face the multi-faceted with a broad conceptual background in the Biological sciences / Computing sciences / Physical sciences.
PEO 4:	Acquire practical skills to gather information, assess, create and execute new ideas to develop entrepreneurial skills are trained to take up higher learning programmes.
PEO 5:	Apply knowledge and skill in the design and development to technical, analytical and creative skills. Ability to use modern instrumentation and laboratory techniques to design and perform experiments in almost all the fields of Physics.

Programme Outcomes (PO):

On completion of the course the learner will be able to

PO 1:	Undergraduate students are to be passionately engaged in initial learning with an aim to think differently as agents of new knowledge, understanding and applying new ideas in order to acquire employability/ self employment.
PO 2:	Undergraduate students are trained to take up higher learning programmes.
PO 3:	Undergraduate students are made to be competent and socially responsible.
PO 4:	Undergraduate students are to be exposed to technical, analytical and creative skills.
PO 5:	Undergraduate students are to be imparted with a broad conceptual background in the Biological sciences / Computing sciences / Physical sciences

Programme Specific Outcomes (PSO):

On completion of the course the learner will be able to

PSO 1:	Enhance conceptual knowledge
PSO 2:	Awareness on impact of physics
PSO 3:	Observational, measuring and computational techniques
PSO 4:	Impart experimental skills
PSO 5:	Improve problem analyzing, logical thinking, reasoning, troubleshooting and solving skill

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B.Sc. PHYISCS 2021- 2024 Batch

STRUCTURE OF THE PROGRAMME

Part	Title of the part	No. of Courses	Hours	Credit
I	LC- Language Course	4	24	12
II	ELC – English Language Course	4	24	12
III	CC- Core Course	13	70	63
	AC –Allied Course	6	28	18
	MBE - Major Based Elective	3	17	17
IV	NME - Non- Major Elective	3	6	6
	SBE - Skill Based Elective	2	4	4
	SSD – Soft Skill Development	0	0	1
V	ES - Environmental Studies	1	2	2
	VE - Value Education	1	2	2
	EA - Extension Activities	1	2	2
	GS - Gender Studies	1	1	1
	Total	**39**	**180**	**140**

*** Extra Credit Courses:**

Semester I - Electronics Instrumentation and Circuits
Semester II - Applications of Digital Multimeter

B.Sc. PHYSICS 2021- 2024 Batch

SCHEME OF THE PROGRAMME

Sem.	Part	Course Code	Course	Ins. Hrs	Credit	Exam Hours	Marks		Total Marks
							CIA	SE	
I	I	LCTA	LC- Language Course Ikkala Ilakkiyam	6	3	3	25	75	100
	II	LCEA	ELC – English Language Course Prose for Effective Communication	6	3	3	25	75	100
	III	PUA	CC- Core Course I Properties of Matter and Acoustics	6	6	3	25	75	100
		PUBY	CC- Core Course II Practical I	3	-	-	-	-	-
		MUA1	AC –Allied Course I Mathematics I	4	3	3	25	75	100
		MUA2	AC –Allied Course II Mathematics II	3	-	-	-	-	-
	IV	VE	Value Education	2	2	3	25	75	100
		Total		**30**	**17**	**-**	**-**	**-**	**500**
II	I	LCTB	LC- Language Course Idaikala Ilakkiyam Puthinamum	6	3	3	25	75	100
	II	LCEB	ELC – English Language Course Poetry for Effective Communication	6	3	3	25	75	100
	III	PUC	CC - Core Course III Mechanics	6	6	3	25	75	100
		PUBY	CC- Core Course II Practical I	3	3	3	40	60	100
		MUA2	AC -Allied Course II Mathematics II	2	3	3	25	75	100
		MUA3	AC -Allied Course III Mathematics III	5	3	2	25	75	100
	IV	ES	Environmental Studies	2	2	3	25	75	100
		Total		**30**	**23**				**700**

III	I	LCTC	LC- Language Course Kappiyamum Nadagamum	6	3	3	25	75	100
	II	LCEC	ELC – English Language Course Drama for Effective Communication	6	3	3	25	75	100
	III	PUD	CC - Core Course IV Thermal Physics	5	5	3	25	75	100
		PUEY	CC - Core Course V Practical II	4	-	-	-	-	-
		QUA1	AC -Allied Course I Chemistry I	5	3	3	25	75	100
		QUA2Y	AC -Allied Course II Chemistry II	2	-	-	-	-	-
	IV	PUE1	NME -Non Major Elective I Energy Physics / Physics for Competitive Examinations	2	2	3	25	75	100
			Total	**30**	**16**	-	-	-	**500**
IV	I	LCTD	LC- Language Course Pandaya Ilakkiyamum Urainadayum	6	3	3	25	75	100
	II	LCED	ELC – English Language Course Short stories for Effective Communication	6	3	3	25	75	100
	III	PUF	CC - Core Course VII Electricity Magnetism and Electromagnetism	5	5	3	25	75	100
		PUEY	CC - Core Course VIII Practical II	2	4	3	40	60	100
		QUA2Y	AC -Allied Course II Practical II	3	3	3	40	60	100
		QUA3	AC -Allied Course III Chemistry III	4	3	3	25	75	100
	IV	PUE2	NME - Non Major Elective II Weather Forecasting / Remote Sensing & GIS	2	2	3	25	75	100
	V	PUS1	SBE – Skill- Based Elective I Astrophysics / Space Science	2	2	3	25	75	100
			Total	**30**	**25**	-	-	-	**800**

V	III	PUG	CC - Core Course IX Optics	5	5	3	25	75	100
		PUH	CC- Core Course X Atomic and Molecular Physics	5	5	3	25	75	100
		PUI	CC - Core Course XI Electronics	5	5	3	25	75	100
		PUJY	CC- Core Course XII Practical III	4	4	3	40	60	100
		PUE3	MBE –Major Based Elective I Microprocessor and C Programming / Principles of Information Technology	5	5	3	40	60	100
	IV	PUS2	SBE –Skill Based Elective II Biomedical Instrumentation / Medical Physics	2	2	3	25	75	100
		PUS3	SBE – Skill Based Elective III Statistics / Statistical Interference	2	2	3	25	75	100
		SSD	Soft Skills Development	2	2	3	25	75	100
			Total	**30**	**30**	**-**	**-**	**-**	**800**
VI	III	PUK	CC- Core Course – X III Nuclear Physics	6	6	3	25	75	100
		PUL	CC- Core Course – XIV Classical and Quantum Physics	6	6	3	25	75	100
		PUMY	CC - Core Course – XV Practical IV	6	5	3	40	60	100
		PUE4	MBE – Major Based Elective II Materials Science / Nano Materials and Applications	5	5	3	25	75	100
		PUE5	MBE – Major Based Elective III Communications Physics / Computer Organization and Architecture	6	5	3	25	75	100
	V	EA	Extension Activities	-	1	-	-	-	-
		GS	Gender Studies	1	1	3	25	75	100
			Total	**30**	**29**	**-**	**-**	**-**	**600**
	Grand Total			**180**	**140**	**-**	**-**	**-**	**3900**

Semester-I / Core Course-I	**PROPERTIES OF MATTER AND ACOUSTICS**	**Course Code: PUA**
Instruction Hours: 6	**Credits: 6**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To Know the elastic behavior of substance • To Examine how bending moment various at the cut position of the beam • for various loading condition • To learn about the fluid property of the surface tension whenever there is an • Interfacial between a liquid, solid or a gas. • To measure the viscosity of a sample liquid. • To learn the basic principles of Acoustics.	
UNIT	**CONTENT**	**HOURS**
I	**ELASTICITY** Hooke's law – Stress-Strain diagram – Factors affecting elasticity- Different moduli of elasticity - Relation between the elastic moduli – Poisson's ratio –expression for poisson's ratio in terms of elastic constant-Twisting couple on a cylinder – Determination of rigidity modulus by static torsion – Work done in twisting a wire - Torsional oscillations of a body-Torsion pendulum .	18
II	**BENDING OF BEAMS** Bending of beams-Expression for bending moment– Cantilever–Expression for depression of the loaded end of a cantilever — Young's modulus by measuring the tilt in a loaded cantilever – Oscillation of a cantilever - Non-uniform bending –	18

	Expression for depression- Uniform bending – Expression for elevation –Experimental determination of Young's modulus using pin and microscope method (Non-uniform bending – Uniform bending) - Determination of Young's modulus by Koenig's method.	
	SURFACE TENSION Definition – Molecular forces – Explanation of surface tension on kinetic theory – Surface energy – Work done on increasing the area of a surface -Angle of contact - Neumann's triangle- Excess pressure inside a liquid drop and soap bubble - Excess pressure inside a curved liquid surface - Force between two plates separated by a thin layer of a liquid - Experimental determination of surface tension - Jaegar's method - Drop- weight method - Capillary rise method - Variation of surface tension with temperature.	18
IV	**VISCOSITY** Newton's law of viscous flow – streamlined and turbulent motion – Reynold's number - Poiseuille's formula for the flow of a liquid through a horizontal capillary tube – Experimental determination of co-efficient of a liquid by Poiseuille's method - Ostwald's viscometer – Terminal velocity and Stokes' formula - Viscosity of gases – Meyer's formula - Rankine's method - Variation of viscosity with temperature and pressure - Lubrication. Equation of continuity of flow – Euler's equation for unidirectional flow -Bernoulli's theorem – Filter pump and Wings of aero plane - Torricelli's theorem - Pitot tube.	18
V	**ACOUSTICS** Newton's Formula for velocity of sound –Effect of Temperature, Pressure, Humidity, Density of medium and Wind - Musical Sound and Noise – Speech- Characteristics of Musical sound – Intensity of sound – Measurement of intensity of sound :Decibel and Phon- Bel. Reverberation – Sabine's Reverberation formula – factors affecting the acoustics of buildings – Sound distribution in an Auditorium – Requisites for good acoustics – Ultrasonic's – Production and detection – Medical applications of Ultrasonic waves.	18

VI	**ANY THREE:** Experimental determination of Young's modulus resonant frequency method and ultrasonic echo-pulse method Determination of Surface tension by ripple method Discussion on industrial applications of Ultrasonic waves Study of different types of viscometers	Practical

Text book

R. Murugeshan, Properties of matter, S. Chand & Co. Pvt. Ltd., Revised edition, 2012.

Brijlal& N. Subramanyam, Properties of matter, VikasPublishng. Pvt.Ltd, 2005.

Brijlal& N. Subramanyam, 'A Text Book of Sound', Vikas Publishing. Pvt. Ltd, 2008

Reference Books:

1. Feynman, Lectures on Physics. Vol. I & II by Richard P. Feynman, 2012.
2. David Halliday and Robert Resnick, Fundamentals of Physics by Wiley Plus., 2013.
3. B.H. Flowers and E. Mendoza, Properties of matter, Wiley Plus, 1991.
4. H.R. Gulati, Fundamentals of General properties of matter, S. Chand & Co. Pvt. Ltd, 2012.
5. Chatterjee and Sen Gupta, A treatise on general properties of matter, New central Books agency (p) Ltd, Kolkata, 2001.
6. R.L. Saihgal, A Text Book of Sound, S. Chand & Co. Pvt. Ltd, New Delhi, 1979.

Web Resources

http://www.physicstutorial.org

https:// www.sciencelearn.org

Acoustics-Basics Physics, Theory and Methods-P.Filippi,et al.,(Elsevier,1999)

Course Outcomes:

On completion of the course the learner will be able

CO 1: To learn how to measure elasticity by various methods

CO 2: To demonstrate a basic understanding of bending of beams, depression and Elevation of Cantilever.

CO 3: Define surface tension as a Physical Property and the units that are used to measure it.

CO 4: Learn about the formula for viscosity, fluid flow and measurement of viscosity using lab experiments.

CO 5: Experience when our ears are excited by vibration in the gas that surrounds us an\production, detection and medical applications of Ultrasonic waves.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester: I & II Core Course II	CORE PRACTICAL – I	Course Code: PUBY
Exam Hours: 3	Credits: 3	No. of Hours / Week: 3
Internal: 40	External: 60	Total Marks: 100

Course Objectives:

- To motivate and educate the students to acquire skill in physics Experiments.
- Experimental determination of Young's modulus.
- To Measure of length using Vernier calipers, Screw gauge and travelling microscope.
- To understand the principle and carry out the experiments systematically.
- In the laboratory course, the hands-on experience of using surface tension, Coefficient of viscosity liquid in Poiseuille's flow method, Searle's viscometer method.

LIST OF EXPERIMENTS

1. Measurements of length (or diameter) using Vernier calipers, Screw gauge and travelling microscope.
2. Non uniform bending - Pin & Microscope Method.
3. Cantilever depression—Scale and Telescope Method.
4. Surface Tension, Interfacial Surface Tension– Drop weight Method.
5. Surface Tension by Capillary rise method.
6. Compound pendulum - g & k determination.
7. Uniform bending –Scale and Telescope.
8. Static Torsion -Determination of Rigidity modulus (n).
9. Torsional Pendulum – Rigidity modulus (n) and moment of inertia (I).
10. Coefficient of viscosity of liquid—Poiseuille's flow method.
11. Coefficient of viscosity of highly viscous liquid—Searle's viscometer method.
12. Stoke's method - Viscosity of highly viscous liquid.

Text Books:

1. Dr. S. Somasundaram, Practical Physics, Apsara publications, Tiruchirapalli, 2012.
2. Department of Physics, Practical Physics, (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli 1998.

Web-Resources:

Online Lab Manual

https://www.olabs.edu.in

Course Outcomes:

On completion of the course the learner will be able

CO 1: To learn how to measure viscosity and Surface tension by various methods.

CO 2: To demonstrate a basic understanding of bending of beams, depression of Cantilever.

CO 3: To demonstrate surface tension as a physical Property and the units that is used to measure it.

CO 4: In the laboratory course they apply the experiments related to mechanics (Compound pendulum).

CO 5: In the laboratory course, the experiments related to Properties of Matter elastic properties (Young Modulus and Modulus of Rigidity) and fluid dynamics(Verification of Stokes law, Searle method) etc.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-II / Core Course-III	MECHANICS	Course Code: PUC
Instruction Hours: 6	Credits: 6	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• An attempt is made to give a better insight of the change of position of any physical object or event and their consequences. • Apply Kepler's law to describe the motion of planets and satellite in circular orbit, • through the study of law of Gravitation. • Describe special relativistic effects and their effects on the mass and energy of a moving object. • Understand that the center of gravity, center of pressure and the atmospheric Pressure	
UNIT	**CONTENT**	**HOURS**
I	**PROJECTILE, IMPULSE AND IMPACT** Projectile - particle projected in any direction - Path of a projectile is a parabola - Range of a projectile on plane inclined to the horizontal - Maximum range on the inclined plane - Impulse of a force - Laws of impact - Direct impact between two smooth spheres - oblique impact between two smooth spheres - Impact of a smooth sphere on a smooth fixed horizontal plane - Loss of KE due to direct impact - Oblique impact-reduced mass.	18
II	**MOTION ON A PLANE CURVE** Centripetal and centrifugal forces - Hodograph - Expression for normal acceleration Motion of a cyclist along a curved path - Motion of a railway carriage round a curved track- upsetting of a carriage - Motion	18

	of a carriage on a banked up curve - Effect of earth's rotation on the value of the acceleration due to gravity - Variation of 'g' with altitude, latitude and depth.	
III	**GRAVITATION** Newton's law of gravitation - Mass and density of earth - Inertial and Gravitation mass - Determination of G-Boy's experiment -Kepler's Laws of planetary motion -Deduction of Newton's law of gravitation from Kepler's Law - Gravitation - Field - potential -Intensity of Gravitational field - gravitational potential due to a point mass - Equipotential surface -Gravitational potential and field due to a spherical shell and solid sphere – Escape velocity –Orbital velocity.	18
IV	**DYNAMICS OF RIGID BODY AND FRICTION** Moment of Inertia - Kinetic energy and angular momentum of rotating body- Theorems of perpendicular and parallel axes - Acceleration of a body rolling down an inclined plane without slipping - Oscillations of a small sphere on a large concave smooth surface - Compound pendulum - Centre of suspension and centre of oscillation - Centre of percussion - Minimum period of a compound pendulum - Kater's pendulum. Friction - Laws of friction - Resultant reaction - Angle and cone of friction - Equilibrium of a body on a rough plane inclined to the horizontal - The friction clutch.	18
V	**CENTRE OF GRAVITY, CENTRE OF PRESSURE, FLOATING BODIES,** **ATMOSPHERIC PRESSURE** Centre of gravity of a body - Centre of gravity of a trapezoidal lamina - C.G. of a solid hemisphere - C.G. of a solid tetrahedron - C.G. of a solid cone. Centre of pressure - rectangular lamina - triangular lamina - triangular lamina immersed in a liquid. Conditions of equilibrium of a floating body - Stability of equilibrium of a floating body - Metacentre - Experimental determination of a metacentric height of aship. The barometer - Fortin's barometer - Correction for a	18

	barometer - Faulty barometer - Variation of atmospheric pressure with altitude.	
VI	**ANY THREE:** C.G. of a hollow hemisphere Study and analysis of Aneroid Barometer and Cistern Barometer Determination of 'G' using Cavendish Method Calculation of time period of Foucalt and Bifilar Pendulum	Group Discussion

Text Books:

1. M. Narayanamurthi and N. Nagarathinam, Dynamics, The National Publishing Company 2005, Chennai.
2. M. Narayanamurthi and N. Nagarathinam, Statics, Hydrostatics andHydrodynamics - The National Publishing Company 2005, Chennai

Reference Books:

1. R. Murugesan, Mechanics and Mathematical Physics, S. Chand & Company Ltd., New Delhi, 2008.
2. D.S. Mathur, Mechanics, S. Chand & Company Ltd., New Delhi - 1990.

Web-Resources:

www.freebookcentre.net/Physics/Mechanics-Books-Download.htm

An Introduction To The Special Theory of Relativity.Pdf

Course Outcomes:

CO 1: Understand Laws of Motion and their application

CO 2: Learn the concept of Conservation of Energy, Momentum, Angular

Momentum and pply them to basic problems.

CO 3: Understand the analogy between Translational and Rotational Dynamics, and application of both motions simultaneously in analyzing rolling with slipping.

CO 4: Develop the Energy of the Friction with the Compound Pendulum and

Friction Clutch.

CO 5: To understand various Dynamical Situations, Notion of Inertial Frames and Concept of Galilean Invariance.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	M
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	M	S	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-III / Core Course-IV	**THERMAL PHYSICS**	**Course Code: PUD**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives	• To understand the phenomena connected with heat as radiation, conduction, different thermal capacities of substances • To learn about the converse process of making heat to do mechanical work. • Students learn about the concepts of heat, work, and energy. • Student learns the different laws of thermodynamics. • To learn thermo-dynamical functions and there relations.

UNIT	CONTENT	HOURS
I	**Specific Heat** Specific heat of solids – Method of mixtures – radation correction – Dulong and Petit's law - Quantum theory - Einstein's theory of specific heat – Debye's theory of specific heat– Specific heat of liquids – Newton's law of cooling - Specific heat of gases – Mayer's Relation – Quantization of various contributions to energy of diatomic molecules – Specific heat of diatomic gases.	18
II	**Conduction.** Coefficient of Thermal Conductivity - Rectilinear Flow of Heat along a Bar - Thermal conductivity of good conductors - Lee's method for metals – Forbe'smethod to find K – Lee's disc method for Bad Conductors – Heat Flow Through a Compound wall – Accretion of Ice on Ponds – Wiedemann-Franz law – Practical applications of conduction of heat.	18

III	**Radiation** Radiation – Stefan's law - Deduction of Newton's law from Stefan's law – Boltzmann's law – Block body radiation – Wein's law – Rayleigh-Jean's law – Planck's law – Angstrom Pyrheliometer – Solar constant – Surface temperature of sun - Sources of solar energy – Photo voltaic cell	18
IV	**Low Temperature** Joule – Thomson's effect – Porous plug experiment – Liquefaction of gases –Linde's method – Liguefaction of hydrogen - Adiabatic demagnetization – Liquefaction of He – Practical applications of low temperature – Refrigerating mechanism – Air conditioning mechanism	18
V	**Thermodynamics** Zeroth law of thermodynamics – First law of thermodynamics – Heat engines – Reversible and irreversible process - Carnot's theorem – Second law of thermodynamics - Thermodynamic Scale of temperature – Entropy – Change of entropy in reversible and irreversible processes – Temperature – entropy diagram (T.S) – Law of increase of entropy – Maxwell's thermo dynamical relations – Clausius' - Claypeyron's latent heat equations.	18
VI	**ANY THREE:** • Determination of Coefficient of Thermal Conductivity • Principle and working of Air conditioning mechanism • Determination of Change of entropy in reversible and irreversible processes • Working of Photo voltaic cell • Determination of Planck's constant	Practical

Text Books:

1. Brijlal and Subramaniyam, *Heat and Thermodynamics,* S. Chand &Co., 2001.

Reference Books:

1. J. B. Rajam and C. L Arora, *Heat and Thermodynamics*, S. Chand & Co.1983.
2. Brijlal and Subramaniyam, *Heat and Thermodynamics & Statistical physics*, S. Chand & Co. 2015.
3. M. Narayanamoorthy and N. Nagarathinam, *Heat*, National publishing Co, Chennai, Eight edition, 1987.

Web-Resources:

https://www.compadre.org/STP/

http://www.rossmanchance.com/applets/index.html

http://www.thermofluids.net/:

Course Outcomes:

On completion of the course the learner will be able

CO 1: Students will demonstrate a basic understanding of the concepts and underlying principles of classical physics.

CO 2: Students will gain an appreciation of the quantitative methods used in Physics

CO 3: Understand the concept of thermodynamics and there laws.

CO 4: Understand the Heat Engine and there uses.

CO 5: Describe the Thermodynamic function and there relations.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S

Semester-IV / Core Course-V	**CORE PRACTICAL II**	**Course Code: PUEY**
Instruction Hours: 4	**Credits: 4**	**Exam Hours: 3**
Internal Marks - 40	**External Marks - 60**	**Total Marks: 100**

Course Objectives:

- To enhance the knowledge in experimental physics.
- To comprehend the theory and objectives of the experiment
- To conceive the procedure to perform the experiment
- To check the suitability of the equipment, apparatus, tool regarding their working and functioning
- To know the limitations of measuring device and find its least count, error etc.

LIST OF EXPERIMENTS:

(Any Twelve Experiments)

1. Specific Heat Capacity of Liquid –Newtons Cooling Method.
2. B.G.Absolute capacity of condenser.
3. Specific Heat Capacity ofLiquid-Jules calorimeter.
4. Newtons rings –Determination of radius of curvature
5. Emissive power of a surface - Spherical calorimeter.
6. Thermal conductivity of a bad conductor -Lee's disc method.
7. Carey Foster's Bridge –specific resistance determination.
8. Potentiometer - Ammeter calibration
9. Potentiometer - Voltmeter calibration - low range.
10. Potentiometer - determination of resistance.
11. Figure of merit of a mirror Galvanometer.
12. Spectrometer -Determination μ of a liquid.
13. Spectrometer- Grating--normal incidence method.
14. Air Wedge - determination of Thickness of a thin wire.

Reference:

1. Dr. S. Somasundaram, Practical Physics, Apsara publications, Tiruchirapalli, 2012.

Course Outcomes:

On completion of the course the learner will be able

CO 1: Gain knowledge in the scientific methods and learn the process
CO 2: Educate The Basics Of Instrumentation, Data Acquisition And Interpretation of Results
CO 3: Enhance The Students Understand The Concepts In Materials Properties
CO 4: Have a deep knowledge of fundamentals of optics, electric circuits
CO 5Analyze the specific heat capacity, refractive index as per the standard procedure

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	M	M	S	S	S	S	S	S	S
CO4	S	S	M	M	S	S	S	S	M	S
CO5	S	M	M	S	S	S	S	S	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-III / NON-MAJOR ELECTIVE I	**ENERGY PHYSICS**	**Course Code: PUE1**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives:	• To make the students to understand the present day crisis of need for conserving energy and alternatives are provided. • Know percentages and have understanding for magnitudes of energy and resources used • Understand the special engineering challenges of using each of these sources of energy efficiently and environmentally effectively. • Understand the economics behind the costs of the uses and applications of each of these forms of energy • Understand the energy conversion systems for nuclear power plants, the advantages/disadvantages (including overall environmental effects) of each type of present plants.

UNIT	CONTENT	HOURS
I	**Conventional Energy Sources** World reserve- Commercial energy sources and their availability – Various forms of energy – Renewable and Conventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits.	6
II	**Solar energy** Renewable energy sources – Solar energy – nature and Solar	6

	radiation – components – Solar heaters – Crop dryers – Solar cookers – Water desalination (block diagram) –Photovoltaic generation – merits and demerits.	
III	**Biomass energy fundamentals:** Biomass Resources –Biofuels – Liquid Fuel –Biomass Conversion Technology – Biochemical Conversion – Biomass Gasification – Bio Gas Plants.	6
IV	**Biomass Utilization** Bio Gas Plants – Wood Gasification – Advantage & Disadvantages of Biomass as Energy Source Power Generation Liquid Waste, Bio Mass Co Generation –Ethanol, Biodieselc - Biomass Resource Development In India	6
V	**Other forms of Energy Sources** Geothermal energy – Wind energy – Ocean thermal energy conversion – Energy from waves and tides (basic ideas).	6

Text Book:

1. D.P. Kothari, K.C. Singal& Rakesh Ranjan, Renewable energy sources and emerging Technologies, Prentice Hall of India Pvt. Ltd., New Delhi (2008).
2. Study Material by Department of Physics –Unit V

Reference Book

S.A. Abbasiand NasemaAbbasi, *Renewable Energy sources and their environmental impact,* PHI Learning Pvt. Ltd., New Delhi (2008).

Web Resources:

http://www.lanl.gov/external

http://fnalpubs.fnal.gov

Course Outcomes:

On completion of the course the learner will be able

CO 1: Understand the sources of energy and their contributions to the energy and power needs of the nation and the world.
CO 2: Be able to effectively use Rankine Cycle analysis
CO 3: Understand the differences between large quantities of fuel and waste
CO 4: Fully appreciate the aspect of capital cost amortization and allocation to unit of energy produced.
CO 5: Be able to analyze comparisons of capital cost allocation, operating cost, including fuel costs. Special attention is given to the renewables for which there is zero or negligible fuel cost.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	M	S	M	S	S	S	M	S	S	S
CO3	S	M	M	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	M	M	M	M
CO5	S	S	S	S	S	S	S	S	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-III / NON-MAJOR ELECTIVE I	**PHYSICS FOR COMPETITIVE EXAMINATIONS**	**Course Code: PUE1**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To provide awareness to the students about the various types of jobs offered both in the central and state government • To help the students to choose the area where they are interested • To develop competitive skills through various types of objective tests • To train them by conducting aptitude test • To enhance their ability to face the competitive exams	
UNIT	**CONTENT**	**HOURS**
I	**Units & Dimensions** SI units & dimensions -Dimensional analysis -Least count -Significant figures.	6
II	**Kinematics** Velocity-Acceleration-Motion in one and two dimensions (Cartesian coordinates only)-Motion of projectiles.	6
III	**Dynamics** Newton's law of motion-Inertial and uniformly accelerated frames of reference-Force-Static and dynamic friction.	6
IV	**Gravity** Law of gravitation-Gravitational potential and field -Acceleration due to gravity-Motion of planets and satellites in circular orbits-Escape velocity.	6

V	**Law of thermodynamics** Zeroth law -First and second law of thermodynamics and its applications (only for ideal gases)	6

Text Book:

Study Material Prepared by Department of Physics

Course Outcomes:

On completion of the course the learner will be able

CO 1: Deeper knowledge of subjects

CO 2: It motivates the students to prepare for high level competitive exams

CO 3: Competitive exams will enhance the skill of understanding the application of concepts, which is required in a broader context when we appear for higher level exams

CO 4: Early exposure to learning and competition builds confidence and sharpens skills which raise ones level from other students on the same platform.

CO5:It boosts morale while moving ahead in the future.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	M	M	S
CO3	S	S	S	S	S	S	M	S	M	S
CO4	S	S	M	S	M	S	M	S	M	S
CO5	S	S	M	S	M	S	M	S	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester - IV / Core Course -VI	**ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM**	**Course Code: PUF**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• This course provides an in depth coverage of behaviour of stationary electric charges, electricity, magnetism and how they are connected. • This paper deals with the study of Electric field, Magnetic field, and Electromagnetic theory. • The first unit gives the mathematical idea behind the electrostatic field. • The second unit deals with the physics behind the Magneto statistics. • Last unit deals with the electromagnetic theory.	
UNIT	**CONTENT**	**HOURS**
I	**Electrostatics** Coulomb's Law – Gauss's Law and its applications (Electric Field due to a uniformly charged sphere, hollow cylinder & solid cylinder)– Electric Potential – Potential at a point due to a uniformly charged conducting sphere – Principle of a capacitor– Capacity of a spherical and cylindrical capacitors – Energy stored in a charged capacitor–Loss of energy on sharing of charges between two capacitors.	18
II	**Current Electricity** Ampere's circuital law and its applications -Field along the axis of a circular coil and Solenoid–Theory of Ballistic Galvanometer –Figure of merit– Damping Correction– Kirchhoff's Laws of Electricity –Wheatstone 's bridge–Carey Foster's Bridge–Potentiometer– Calibration of Ammeter – Calibration of Voltmeter (Low range and High	18

	range) – Comparison of Resistances.	
III	**Magnetism** Intensity of Magnetization– Magnetic Susceptibility– Magnetic Permeability – Types of magnetic materials– Properties of para, dia and ferromagnetic materials–Langevin's theory of dia and para magnetism– Weiss's theory of ferromagnetism – B-H curve–Energy loss due to magnetic hysteresis – Ballistic Galvanometer method for plotting B-H curve - Magnetic properties of iron and steel.	18
IV	**Electromagnetic Induction** Laws of electromagnetic induction– Self and mutual induction– Self-inductance of a solenoid– Mutual inductance of a pair of solenoids–Coefficient of coupling–Experimental determination of self (Rayleigh's method) and mutual inductance– Growth and decay of current in a circuit containing L and R–Growth and decay of charge in a circuit containing C and R.	18
V	**AC Circuits** Alternating EMF applied to series circuits containing LC, LR and CR– Alternating EMF applied to circuits containing L, C and R– Series and Parallel resonance circuits– Sharpness of resonance–Q factor— Power in AC circuits (R, L-R, L-C-R only) – Power factor–Wattless current – Choke Coil – Transformer – Uses of Transformers – Skin Effect.	18
VI	**ANY THREE:** • Application of Gauss Law for electric field due to a infinite, uniformly charged straight conductor • Determination of Absolute capacity of capacitance using Ballistic Galvanometer • Study of Anderson's Bridge • Determination of Susceptibility – Curie Balance method • Growth and decay of S, C and R • Three phase AC generators and motors	Group Discussion

Text Books:

1. BrijLal and N. Subrahmanyam, *A Text Book of Electricity and Magnetism*, RatanPrakasanMandir Educational & University Publishers, new Deihi,2000.

Reference Book:

1. D. L. Sehgal, K. L. Chopra and N. K. Sehgal, *Electricity and Magnetism*, S. Chand & Sons. New Delhi. 1996.
2. R. Murugeshan, *Electricity and Magnetism*, S. Chand & Company Pvt. Ltd., New Delhi – 2015

Web Resources:

http://www.physicstutorial.org

https:// www.sciencelearn.org

Course Outcomes:

On completion of the course the learner will be able

CO 1: Explain various phenomenon like Ferromagnetism, ant ferromagnetism etc.
CO 2: Understand the relation in between Electromagnetic theory.
CO 3: Explain various phenomenon in light of maxwell equations.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	M	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	M	S	S	M
CO4	S	M	M	S	S	S	S	S	S	S
CO5	S	M	M	S	S	S	M	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-IV / Non Major Elective II	**WEATHER FORECASTING**	**Course Code: PUE2**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• Describe the four types of air masses and how they interact to form fronts. • Demonstrate knowledge of atmospheric composition and structure. • Demonstrate knowledge of scientific methods relating to qualitative and quantitative analysis of atmospheric variables and can develop some basic analysis techniques to aid in understanding weather and climate • Demonstrate knowledge of a wide range of atmospheric phenomena and their roles in affecting weather and climate on local, regional, continental, and global scale • Demonstrate knowledge of a variety of mesoscale and small-scale atmospheric phenomena, including tropical storms, severe thunderstorms, and tornadoes	
UNIT	**CONTENT**	**HOURS**
I	**Introduction to atmosphere** Elementary ideas of atmosphere – meteoroids, hydrosphere, cry sphere, sea breeze – land breeze – Difference between weather, climate, and seasons – The Earth Orbit around the sun – climate.	6
II	**Measuring the weather** Clouds – types of clouds – Atmospheric pressure – Clouds – Humidity – Visibility - Surface Observation – Upper Air Observatory – Warm rain – Artificial rain.	6
III	**Weather Systems** Thunder clouds & Hazards – Aviation hazards due to thunderstorms	6

	– Cyclones – Cyclones genesis & dissipation – Cyclone structure – Anticyclones.	
IV	**Climate and climate change** Climatic classifications – climate – Causes of Climate change – Mechanisms of Climate Change – Acid rain – Pollution – Atmospheric Pressure.	6
V	**Basics of weather forecasting** Weather – Fore casting – Numerical Weather Prediction (NWP) – Weather Observation – Weather Analysis and Forecasting – Metrological Analyses – Types of Analyses.	6

Text Books:

1. Metrology and Weather – C.Rangannathan, forms Director , India metrological Department.

Web Resources:

https://www.youtube.com/user/NWSNHC

weather.gov/wrn/intellectualdisabilities

Course Outcomes:

On completion of the course the learner will be able

CO 1: Students can demonstrate knowledge of the typical vertical variation of the basic variables used to quantify the atmospheric state, including temperature, pressure, humidity, winds, and natural and anthropogenic particles

CO 2: To basic techniques used by meteorologists (and other scientists) to gather and interpret atmospheric data

CO 3: To learn of climate and climate change, together with the possible influences that humans have on diverse climate phenomena

CO 4: To knowledge of the typical vertical variation of the basic variables used to quantify the atmospheric state, including temperature, pressure, humidity, winds, and natural and anthropogenic particles

CO 5: To meteorologists (and other scientists) to gather and interpret atmospheric data

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	M	M	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	M	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-IV / Non Major Elective II	**REMOTE SENSING AND GIS**	**Course Code: PUE2**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• Apply the concepts of Photogrametry and its applications such as determination of heights of objects on terrain. • Understand the basic concept of Remote Sensing and know about different types of satellite and sensors. • Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps • Understand different components of GIS and Learning about map projection and coordinate system • Develop knowledge on conversion of data from analogue to digital and working with GIS software.	
UNIT	**CONTENT**	**HOURS**
I	**Remote Sensing:** Definition and Types: Aerial, Satellite and Radar, Development of Space Programmes - History and Organization Associated with Remote Sensing in India and in other Countries.	6
II	**Remote Sensing:** Sources of Energy, Electromagnetic Radiations (EMR) Atmospheric Windows, Energy Interaction with Atmosphere and Earth, Types of Platforms, Active and Passive Remote Sensing Methods, Ideal Remote Sensing Systems.	6
III	**Fundamentals of Aerial Remote Sensing:** Components of Aerial Camera, Types of Aerial Photographs, Marginal Information of Aerial Photographs, elements of Photo Interpretation.	6

IV	**Fundamentals of Satellite Remote Sensing:** Types of Satellites: Geostationary and Sun-synchronous Satellites, Resolution: Spatial, Spectral, Radiometric and Temporal, Types of Data Products, Marginal Information of Satellite Images.	6
V	**Geographical Information Systems (GIS)**: Meaning - Developments- Raster and Vector data-Data integration-Global positioning system (GPS) Advantages and Limitations of GIS and GPS.	6

Text Books:

1. Barret, E.C. and Curtie L.F. (1990): Introduction to Environmental Remote Sensing, Chapman and Hall, London.
2. Cambell, James B. (1987): Introduction to Remote Sensing, The Guilford Press, New York.
3. Lillesand, T. M. and Kieper (1987): Remote Sensing and Image Interpretation, John Willy and Sons, New York

Reference Books

1. Lueder, D.R. (1959): Aerial Photographic Interpretation, McGraw Hill Book, Co., New York
2. Wolf, P.R. (1974): Elements of Photogrammetry, McGraw Hill, New York

Course Outcomes:

On completion of the course the learner will be able

CO 1: Understand the concepts of Photogrametry and compute the heights of objects

CO 2: Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies .

CO 3: Understand the basic concept of GIS and its applications, know different types of data representation in GIS

CO 4: Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are

CO 5: Apply knowledge of GIS software and able to work with GIS software in various application fields

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester - IV / Skill Based Elective –I	**ASTROPHYSICS**	**Course Code: PUS1**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To impart an understanding of the great number of diverse phenomena in the Universe through Demonstrate an understanding Stars. • Establish competence in focuses areas of astrophysical theory an experiment. • Student can describe the differences in the life cycles of low vs high-mass stars • Student can describe stellar remnant and the role of degeneracy in forming stellar remnants. • Demonstrate a fundamental understanding of the Solar System.	
UNIT	**CONTENT**	**HOURS**
I	**ELEMENTS OF SPACE DYNAMICS** Man's quest for space - the energy requirements - Rocket propulsion	6
II	**THE HEART OF THE SOLAR SYSTEM** Vital statistics of the Sun - the solar photosphere - the Fraunh offer lines - structure of solar atmosphere - the solar interior - Sunspots and solar activity - other features of the solar activity - Radio radiation of the disturbed Sun	6
III	**SMALL BODIES IN THE SOLAR SYSTEM** Asteroids - Meteorites - Comets as members of the Solar system - Physical properties of comets - Origin and evolution of comets - Space studies of comets – Meteors.	6

IV	**OUR HOME:** 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.	6
V	**Galaxies** Introduction-General structure of the galaxy – general region and the nucleus –the galactic disc –the galactic halo-the mass of the galaxy-continuous radio emission in the galaxy-black holes.	6

Text Books:

1. Astrophysics of the Solar System – KD Abhyankar, University press pvt. Ltd., Hyderabad, 1999
2. An Introduction To Astrophysics- BaidyanathBasu (unit v)

SECTION UNIT

1. 1 - 3.61 I
1. 4.1 – 4.10 II
2. 9.1 - 9.11 III
3. 5.1 – 5.9, 6.1 – 6.6 IV
4. 15.8,16.1,16.7,16.8,16

Web Resources :

http://www.physorg.com/space-news

http://www.newscientist.com/section/space

Course Outcomes:

On completion of the course the learner will be able

CO 1: Become familiar with nuclear particles and different particle accelerators. Student is expected to know the working of different accelerators.

CO 2: Have Peripheral ideas about astronomy and astrophysics

CO 3: Student describe all of the major structures of the Solar System.

CO 4: Student can describe the history of the Solar System.

CO 5: Atmospheres of objects in the solar system.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	S	S
CO2	S	S	M	S	S	S	S	M	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-IV / Skill Based Elective –I	**SPACE SCIENCE**	**Course Code: PUS1**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives	• To Identify galaxy types. • To Illustrate the Sun's location in the Milky Way. • To Describe the history of the universe as explained by the big bang theory. • Explain Earth's motions in space: rotation and revolution. • Explain how stars are born.

UNIT	CONTENT	HOURS
I	**Universe:** Planets - interior planets - exterior planets - crust, mantle and core of the earth - different - region of earth's atmosphere - rotation of the earth - magnetosphere - Van Allen belts - Aurora.	6
II	**Comets, Meteors, Asteroids:** Composition and structure of comets - periodic comets – salient features of asteroids, meteors and its use	6
III	**Sun:** Structure of photosphere, chromosphere, corona - sunspots – solar flares - solar prominences – solarpiages - satellites of planets -structure, phases and their features of moon.	6
IV	**Stars:** Constellations - binary stars - their origin and types star clusters –globular clusters - types of variable stars - types of galaxies.	6
V	**Origin of Universe:** Big bang theory - pulsating theory - steady state theory – composition of universe expansion	6

Text Book :

1. K.D. Abyankar, Astrophysics of the solar system, University press, India (1999)
2. BaidyanathBasu, Sudhindra Nath Biswas AndTanuka Chattopadhyay, An Introduction To Astrophysics, Prentice Hall Of India, New Delhi (2010)

Book for Study:

1. Prof. P. Devadas, The fascinating Astronomy, Devadas Telescopies, Chennai
2. R.P. Singhal, Elements of Space Physics, PHI, (2009)

Web Resources :

http://www.physorg.com/space-news

http://www.newscientist.com/section/space

Course Outcomes:

On completion of the course the learner will be able

CO 1: Demonstrate knowledge and understanding of the structure and function of earth systems and the major interactions among them.

CO 2: Outline the formation of the Earth and the solar system and explain the process of the earth's evolution, with emphasis on geologic time, plate tectonics, weathering and erosion, freshwater systems, oceans, climate and climate change.

CO 3: Demonstrate understanding of the origin and evolution of the universe as well as the birth and death of stars.

CO 4: Discuss the human impact on geological resources and the sustainable use of mineral resources.

CO 5: Discuss the importance of recent developments and applications in earth and planetary science.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	M	S	M	S	S	S	M	S
CO5	S	S	M	S	S	S	M	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester -V / Core Course VII	**OPTICS / III Physics**	**Course Code: PUG**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To familiarize the fundamental laws concerning reflection, refraction, interference, diffraction, polarization, spectrum and Optical Instruments. • The main objective of this subject is to aware the students about of waves and optics. • First unit of deals with the Fourier analysis and Fourier transformation. • The second deals with the matrix method in order to explain various phenomenon. • The third unit describes the Phenomenon like interference phenomenon.	
UNIT	**CONTENT**	**HOURS**
I	**Geometrical optics:** Spherical aberration - Spherical aberration of a thin and thick lens –Methods of reducing Spherical aberration – Coma – Aplanatic surface – Astigmatism – Curvature of the field – Meniscus lens – Distortion – Chromatic aberration - Chromatic aberration in a lens – Circle of least Chromatic aberration – Achromatic lenses.	18
II	**Interference:** Air wedge – Newton's rings – Haidinger's fringes – Brewster's fringes – Michelson Interferometer and its applications – Fabry- Perot Interferometer – Interference filter – Stationary waves in light – Colour photography (qualitatively) – Holography – Construction and reconstruction of a hologram – Applications.	18

III	**Diffraction:** Fresnel's diffraction – Diffraction at a (1) circular aperture (2) Straight edge (3) narrow wire – Fraunhofer diffraction at a single slit – Double slit – Missing orders in a Double slit, Diffraction pattern – Grating (theory) – Oblique incidence – Overlapping of spectral lines - Resolving power – Rayleigh's criterion of resolution- Resolving power of a Telescope and Grating – Dispersive power and resolving power of a grating.	18
IV	**Polarization:** Nicol prism – Nicol prism as an analyzer and polarizer – Huygens's explanation of Double refraction in uniaxial crystals – Double Image polarizing prisms – Elliptical and Circularly polarized light – Production and detection – Quarter wave and half wave plates – Babinets compensator – Optical activity – Fresnel's explanation of optical activity – Laurent's Half shade polarimeter.	18
V	**Optical Instruments:** Microscopes – Simple Microscope (Magnifying glass) – Compound Microscope – Ultra-Microscope – Eyepieces - Huygen's Eyepiece - Ramsden'sEyepiese — Comparison of Eyepieces – Telescope – Refracting astronomical telescope – Abbe Refractometer – Pulfrichrefractometer - Prism binoculars.	18
VI	**ANY THREE:** • Study of working of Kellner's eyepiece • Pulofrich Refractometer • Determination of Cauchy's Constant • Liplich Polarimeter	Group Discussion

Text Books:

1. Dr. N. Subramaniyam, Brijlal and Dr.M.N. Avathanulu, *Optics*,S. Chand &Co. Pvt.Ltd.25 threvised edition , New Delhi ,2012.

Reference Books:

1. Singh & Agarwal, *Optics and Atomic Physics*, PragatiPrakashan Meerut, Nineth edition, 2002.
2. A.B. Gupta, *Modern Optics*, Books and allied (P) Ltd, Kolkata, First edition, 2006.
3. AjoyGhatak, *Optics*, (TMH), New Delhi, Fourth edition, 2009.
4. Arial Lipson, Stephen G.Lipson and Hentry Lipson, *Optical Physics*, Cambrige, Fourth edition, 2011.
5. Schaum's outlines, *Optics*, Tata McGraw Hill, 2011.

Web Resources:

1. https://micro.magnet.fsu.edu/optics/webresources/index.html
2. https://spie.org/education/education-outreach-resources/online-resources?SSO=1

Course Outcomes:

On completion of the course the learner will be able

CO 1: Understand the physics behind various phenomenons in wave and optics.
CO 2: Understand various phenomenons and the cause or origin of them.
CO 3: Explain the relationship in between various optical phenomenons with the Fourier series and matrix.
CO 4: Understand various natural phenomenons which is happening in their surroundings.
CO 5: Explain the relationship in between various optical phenomenons.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	M	S	S	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	M	S
CO5	S	S	M	M	S	S	S	S	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester -V / Core Course VIII	**ATOMIC AND MOLECULAR PHYSICS**	**Course Code: PUH**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives	• The purpose is to understand the outgrowth of the structure, extra nuclear part of the atom and origin of the spectra. • To learn the impact of magnetic field on spectra. • To study the concept of photo electric cell. • To calculate the Zeeman effect and the lande g' factor. • To outline the selection rules for rotational and vibrational spectra.

UNIT	CONTENT	HOURS
I	**Cathode and Positive Ray :** Production and Properties of Cathode rays - Electronic charge - Millikan's oil- drop method - Production and properties of positive rays - Thomson's parabola method - Aston's, Bainbridge's mass - spectrographs (e/m) – Mass defect and Packing Fraction.	18
II	**Atom model :** Vector atom model - Quantum numbers associated with vector atom model - Pauli's exclusion principle - Electronic configuration of elements and periodic table - The Stern and Gerlach experiment - Zeeman effect - Experimental arrangement for the normal Zeeman effect - Larmor's theorem - Quantum mechanical explanation of the normal Zeeman effect - Anomalous Zeeman effect- Paschen Back Effect – Stark effect.	18
III	**X-Rays :** X-rays - production - detection and properties -Bragg's law - Bragg's X-ray spectrometer - Laue's experiment - The Powder crystal	18

	method –Rotating crystal method - Characteristics of X-ray spectrum - Moseley's law - Compton effect - Determination of wavelength - Symmetry operations and elements of Symmetry.	
IV	**Photoelectric Effect and Free Electron theory of metals :** Photoelectric effect - Lenard's experiment - Richardson and Compton experiment - Experimental investigations on the photoelectric effect - Laws of photoelectric emission - Einstein's photoelectric equation - Experimental verification - Millikan's experiment - Photoemissive cell - Photovoltaic cell - Photoconductive cell.	18
V	**Molecular Physics :** Theory of the pure rotational spectrum of a molecule - Theory of the origin of the vibration - rotation spectrum of a molecule - Electronic spectra of molecules - Molecular orbital theory of Hydrogen molecule ion - Heitler-London theory of Hydrogen molecule.	18
VI	**ANY THREE:** • Study of principle and working of Electron Microscope • Study of hyperfine structure • Study and analysis of Bravais lattices and typical crystal structure • Principle and function of Photomultiplier • Study of Rigid rotator	Group Discussion

Text Books:

1. R. Murugesan, Kiruthiga Sivaprasath, *Modern Physics*, S. Chand &Co Ltd., New Delhi, 14th Revised edition, 2014.
2. J.B. Rajam, *Atomic Physics*, S. Chand & Co Ltd., New Delhi, Revised edition, 2009.

Reference Books:

1. Guptha Kumar Sharma J.B. Rajam, *Atomic Physics*, S. Chand & Co Ltd., New Delhi, Revised edition, 2009.
2. Sehgal, Chopra and Sehgal, *Modern physics*, Sultan Chand &Sons,New Delhi.
3. ArturBeiser, Shobhit Mahajan, S. Rai Choudhury, *Concepts of Modern Physics*, Sixth edition, SIE, 2009.

4. S.N .Ghoshal, *Atomic Physics*, S. Chand & Co Ltd., New Delhi, Revised edition, 2004.

Web Resources:

https://nptel.ac.in/courses/115/101/115101003/\

https://physics.berkeley.edu/research/atomic-molecular-and-optical-physics

Course Outcomes:

On completion of the course the learner will be able

CO 1: To analyze various types of spectrography to study about the positive rays.

CO 2: Explain magneto optical properties of materials.

CO 3: To find applications of photo electrical cells and x-rays.

CO 4: They should be able to calculate the effect of an electrical field on the energy levels of the hydrogen atom.

CO 5: Students learn about electronic, rotational and vibrational energy levels of diatomic molecules.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	M	S	S	S	M	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Core Course IX	**ELECTRONICS**	**Course Code: PUI**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives:	• To enable the students to understand all aspects of electronics in a lucid and comprehensive manner. • This course is familiarize the students about the transistor, operational amplifier and Digital electronics Circuit • Acquire the fundamental knowledge and application of the semiconductor Device • Knowledge of the basic principles of electronic circuits operation • Performance Analysis of electronic circuit	
UNIT	**CONTENT**	**HOURS**
I	**Semiconductors, diodes and Bipolar Transistors** Intrinsic and extrinsic semi -conductors –PN junction diode – Biasing–V-I Characteristics– Rectifiers – Half wave – full wave and Bridge rectifiers – Break down mechanisms – Zener diode-characteristics of Zener diode – Zener diode as voltage regulator-Bipolar junction transistor – Basic configurations -Relation between α and β – Characteristic curves of transistor – CB, CE mode – DC load line – DC bias and stabilization – fixed bias – voltage divider bias.	18
II	**Amplifiers and Oscillators** Single stage CE amplifier – Analysis of hybrid equivalent circuit – Power amplifiers – Efficiency of class A,B& C Power amplifier - General theory of feedback – Properties of negative feedback – Criterion for oscillations – Hartley oscillator – Colpitt's oscillator.	18

III	**Operational amplifier** Operational amplifier - Characteristics – Inverting and Non-inverting amplifier – Voltage follower – Adder, Subtractor, Integrator and Differentiator circuits – Log & antilog amplifiers – Op- amp as Comparator – Filters-low, bandpass, high pass filters -A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.	18
IV	**Number Systems, Logic Gates and Boolean Algebra** Introduction to decimal, binary, octal, hexadecimal number systems – Inter conversions– 1's and 2's complements –Logic gates, Symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates. Boolean algebra – De-Morgan's theorems -Reducing Boolean expressions using Boolean laws – SOP forms of expressions (minterms) – Karnaugh map simplification(Four variables).	18
V	**Combinational and Sequential Digital Systems** Half and full adders – Half and full subtractors – Decoder(2:4 line) – Encoder (4:2 line)– Multiplexer(4:1 line) – Demultiplexer (1:4 line) - Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Counters – Four bit asynchronous ripple counter – Mod-10 counter — Synchronous counter – Ring counter - Shift registers – SISO and SIPO shift registers.	18
VI	**ANY THREE:** • Analysis and Comparison of CC, CB and CE modes • Principle and working of Phase Shift Oscillator • Study of Counter type method in A/D and D/A conversion • Simplification of Boolean Algebra using circuit analysis • Analysis of Multiplexer(16:1) and Demultiplexer(1:16) • Study of Up/Down Counter	Group Discussion

Text Books:

1. Mehta V.K., *Principles of Electronics*, S. Chand and company Ltd, 2014.

2. A.P. Malvino, D.P. Leach, *Digital Principles and Application*, IV Edition, Tata McGraw Hill, New Delhi, 2011.
3. V. Vijayendran, *Digital Fundamentals*, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.

Reference Books :

1. Theraja. B.L, *Basic electronics - Solid State*, S.Chand and Company Ltd 2002.
2. Sedha R.S., *A text book of applied Electronics*, S.Chand& company Ltd 2002.
3. W.H.Gothmann, *Digital Electronics*, Prentice Hall of India, Pvt. Ltd., New Delhi 1996.
4. V. Vijayendran, *Digital Fundamentals*, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.

Web Resources:

https://www.electronics-tutorials.ws/
https://www.altair.com/electronics/

Course Outcomes:

On completion of the course the learner will be able

CO 1: Explain the theoretical principles essential for understanding the operation of electronic circuit
CO 2: Measure the characteristics of electronic circuit and present experiment result
CO 3: Analyze electrical circuit and calculate the main parameters
CO 4: Develop Design and create simple analogue and digital electronics circuit
CO 5: Know about the multistage amplifier using BJT and FET various configuration

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S

S - Strongly Correlated

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W-Weakly Correlated

N – No Correlation

Semester -V / Core Practial III	**CORE PRACTIAL III**	**Course Code: PUJY**
Instruction Hours: 4	**Credits: 4**	**Exam Hours: 3**
Internal Marks - 40	**External Marks - 60**	**Total Marks: 100**

Course Objectives:

- To promote scientific temper and to learn physical concepts through these experiments.
- To determine the refractive index of the given small angle and biprism
- To find the Self- induction of a coil using the electrical brides.
- To determine capacitance of a capacitor by comparing the capacitances.
- To write the C program for the different applications.

LIST OF EXPERIMENTS:

(Any Twelve Experiments)

SECTION- A

1. Spectrometer- i-d curve.
2. Spectrometer - i-i' curve.
3. Field along the axis of a coil – determination of M.
4. Potentiometer -Temperature coefficient of thermistor
5. Ballistic Galvanometer-Absolute Determination of Mutual Inductance.
6. Series resonance circuits.
7. Parallel Resonance circuits.
8. Koenig's method – Uniform bending.
9. Spectrometer - Grating-minimum deviation method
10. Spectrometer – Grating - dispersive power.
11. M and H - Absolute determination using deflection and vibration magnetometer.
12. Potentiometer - High range Voltmeter calibration.

SECTION- B

COMPUTER PROGRAMMING IN C (Any TWO)

1. Find the arithmetic mean.
2. Find the median.
3. Find the mode.

4. To fit a Straight line.
5. To fit a Parabola curves.
6. To calculate simple correlation coefficient.
7. To calculate Rank correlation coefficient.

Course Outcomes:

On completion of the course the learner will be able

CO 1: To understand theoretical principles of optics in the experimental method through the determination of refractive index of the prism using the spectrometer.

CO 2: To acquire the acknowledge in electrical devices such as ammeter voltmeter, millimeter and spot galvanometer etc.,

CO 3: To understand the process of electrolysis.

CO 4: To write the application programs in "C" Language

CO 5: Calculate the result accurately and express the same with appropriate significant figures, justified by the degree of accuracy of the instrument

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	M	S	S
CO4	S	S	M	M	S	S	S	S	M	S
CO5	S	S	M	S	S	S	S	S	S	S

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Semester-V / Major Based Elective I	**MICROPROCESSOR AND "C" PROGRAMMING**	**Course Code: PUE3**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives	• The purpose of this course is to introduce students about the key features and implementation of C language and 8085 Microprocessor assembly. • To understand the basic concept of microprocessor • To understand techniques for faster execution of instructions and improve speed of operation and performance microprocessors. • To Learn the fundamental programming concept and methodologies. • To understand the basic architecture of intel 8085 microprocessor. • To practice the fundamental programming methodologies in c programming language.

UNIT	CONTENT	HOURS
I	**Basics of Digital Computer** Basic components of a digital computer - Evolution of microprocessors - Important INTEL microprocessors - Hardware, Software and Firmware - Memory - Semiconductor memories - RAM,ROM - Flash memory – CCD memory – Cache memory - Buses.	18
II	**Intel 8085 and its Architecture** INTEL 8085 - Pin Diagram - Architecture - Various registers - Status Flags - Interrupts and their order of priority - Addressing modes - Direct, Register, Register indirect, Immediate and implicit addressing - Instruction set - Data transfer group - Arithmetic Group - Logical group - Branch group, Stack,	18

	I/O and Machine control group.	
III	**Assembly Language Programming** Addition - subtraction - multiplication -division of two 8- bit numbers - Finding the largest and smallest number in a data array-Arranging a list of numbers in ascending or descending order-complement – multibyte addition and subtraction –decimal addition - subtraction.	18
IV	**Introduction To C** Basic Structure of C Programs – Character set – C tokens - Keywords and identifiers – constants – variables – Data types – declaration of variables – Assigning values to variables – Symbolic constants – Operators and Expressions - Arithmetic operators - Relational, Logical and Assignment operators, Increment and Decrement operators – Conditional operator, Bitwise and Special operators– Arithmetic Expressions – Mathematical functions.	18
V	**Preliminaries and Functions** Data input and output – getchar, putchar, scanf, printf, gets, puts functions – Decision making and branching –if, if…else, else if ladder, switch, break, continue, goto – Decision making and looping – while, do… while, for, nested loops –Arrays (one-, two- and multi-dimensional arrays)- Declaration, Initialization of arrays.	18

Text Books:

1. B. Ram – Fundamentals of Microprocessors and Microcontrollers–Dhanpat Rai Publications (P) Ltd., New Delhi, 2013.
2. E. Balagurusamy – Programming in ANSI C – Tata McGraw Hill Education Private Limited, New Delhi,2012.

Reference Books:

1. R. S.Gaonkar- Microprocessor Architecture, Programming, and Applications with the 8085, Penram International Publishing (India) Private Limited, Mumbai, 2007.
2. K. R. Venugopal and S. R. Prasad – Programming with C – Tata McGraw-Hill Publishing Company Limited, New Delhi, 2002.

Web Resource:

https://onlinecourses.nptel.ac.in/noc19_cs44/preview.
https://www.edaboard.com/threads/getting-started-with-microprocessor-programming-in-c-c.378550

Course Outcomes:

On completion of the course the learner will be able

CO 1: Write programs to run on 8085 microprocessor
CO 2: Understand and device techniques for faster execution of instruction, improve speed of operations.
CO 3: Understand microprocessor and its advantage.
CO 4: Describe the fundamental components of a C program, e.g source file, header file, mainfunction, functions and librarie.
CO 5: Explain and apply fundamental syntax rules for identifies, declarations, expressions, statements and functions.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	M	S	S	S	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Major Based Elective I	**Principles of Information Technology**	**Course Code: PUE3**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives	• To Provide the Basic Concepts in Information Technology • To understand Software and Operating system. • To Learn the fundamental of Data base management System. • To understand the basic of Networking. • To practice the application of Technology.

UNIT	CONTENT	HOURS
I	**Basics of Digital Computer System:** Introduction to Computer – Classification of Digital Computer System – Computer Architecture – Memory Units – Auxiliary Storage Devices – Input and Output Devices.	18
II	**Software:** Introduction to Computer Software – Operating System – Programming Languages–General Software Features and trends.	18
III	**Database Management Systems:** Database Management Systems – Data Processing – Introduction to Database Management System – database design.	18

IV	**Telecommunication:** Introduction to Telecommunication – Networking – Communication System–Distributed System – Internet – Intranet.	18
V	**Multimedia tools:** Multimedia tools – Virtual Reality – E-Commerce – Data warehousing – Data Mining –Applications; Geographical Information System–Computer in Business, Industry, Home, Education and Training.	18

Text Book:

1. Fundamentals of Information Technology, Alexis Leon and Mathews Leon, Vikas Publishing HousePvt.Ltd,2009

Reference Book

1. Henry C. Lucas,Jr., Information Technology for Management–Mc Graw Hill(Part–III).
2. Williams, Sawyer, Hutchinson, Using Information Technology–Mc Graw Hill.

Web Resources

https://www.txcte.org/course-binder/principles-information-technology

https://www.icevonline.com/curriculum/business-marketing-finance-it-media/courses/principles-information-technology

Course Outcomes:

On completion of the course the learner will be able

CO 1:Applying the Basic Concepts in Information Technology

CO 2: Understand Software and Operating system of programming language.

CO 3: Using the fundamental of Data base management System in database design.

CO 4: Design the basic Network.

CO 5: Practice the application of Technology.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	M	S	M	S
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester - V / Skill Based Elective -II	**BIOMEDICAL INSTRUMENTATION**	**Course Code: PUS2**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To understand the underlying physical principles of the biological phenomena • To gain the knowledge about the design and functioning of various biomedical instruments. • To introduce an fundamentals of transducers as applicable to physiology • To explore the human body parameter measurements setups • To make the students understand the basic concepts of forensic techniques.	
UNIT	**CONTENT**	**HOURS**
I	**Human Physiological System** Different systems of human body –skeletal system –circulatory system-respiratory system –digestive system –excretory system –regulatory system –reproductive system –muscular system –components of bio medical instrument system –types of electrodes and transducers(basic ideas**).**	18
II	**Biopotential Recorders** Characteristics of the recording system –electrocardiography(ECG)-ECG lead configuration –ECG recording set up –electroencephalography(EEG)-anatomy of the brain –placement of electrodes –recording setup –analysis of EEG**.**	18

III	Electromyography(EMG) -recording setup –determination of conduction velocities in motor nerves –electroretinography (ERG) – Recording Techniques- electrooculography (EOG)- records with high accuracy .	18
IV	**Physiological Assist Device** Introduction- pacemakers –types of pacemakers –methods of stimulation- external and internal pacemaker-different modes of operation – ventricular synchronous –ventricular inhibited pacemaker (demand pave maker)-defibrillators –types of defibrillators - external and internal defibrillators –heart lung machine –kidney machine- dialysis-hemodialyser.	18
V	**Specialized Medical Equipment 2hrs** Digital thermometer - X-RAY machine - block diagram- radiography and fluoroscopy-application of X-RAY examination –elements of bio-telemetry system – single channel telemetry system.	18

Text Books:

1. Biomedical Instrumentation -Dr.M.Arumugam (Anuratha Agencies).

Reference:

1. Biomedical Instrumentation and Measurements –Leslie Cromwel, Fred J. Weibell, Ericha. Pfeiffer, Prientice Hall of India, Second Edition**.**

Web Resources:

https://www.sciencedirect.com/science/article/pii/B9780128183182000039

http://smegnr.cpas.ac.in/department-of-biomedical-instrumentation/

Course Outcome

On completion of the course the learner will be able

CO 1: Study the function of bioelectric potentials and its importance and understand the different types of waveforms generated by organs.

CO 2: Learn the fundamental knowledge of the electrodes to sense bio potentials.

CO 3: Learn the basic concepts and interpretations of ECG and BP.

CO 4: Understand the anatomy of the nervous system and its signal measurements (EMG, CAT).

CO 5: Analyze and understand the applications of the imaging techniques transmission(x- ray and ultrasound)

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	M	S	S	S	M	M	S
CO2	S	S	M	M	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	M	M	S
CO5	S	S	M	S	S	S	M	M	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Skill Based Elective -II	MEDICAL PHYSICS	Course Code: PUS2
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To understand the basics about the biological systems in our body, their behavior, and the diagnostic devices. • To give basic ideas about how multimedia evidences are useful in crime investigation • To Understand the knowledge in recent trends of measuring bio-signals • To provide knowledge on preparation, Characterization and use of biocompatible metals and non metals for bio implant application. • Designed to provide the knowledge for use of different laser spectroscopic methods in bioanalysis.	
UNIT	**CONTENT**	**HOURS**
I	Basic Anatomical Terminology- Modeling and Measurement – Forces on and in the Body – Physics of the Skeleton – Heat and Cold in Medicine- Energy work and Power of the Body	6
II	Pressure system of the body- Physics of Cardiovascular system- Electricity within the Body – Applications of Electricity and Magnetism in Medicine	6
III	Sound in medicine- Physics of the Ear and Hearing- Light in medicine- Physics of eyes and vision.	6
IV	X-rays- Production of X-rays- X-ray spectra- continues spectra and	6

	characteristic spectra- Coolidge tube- Electro Cardio Graph (ECG) - Block diagram- ECG Leads- Unipolar and bipolar-ECG recording set up. 1982	
V	Electro Encephalo Graph (EEG) - origin- Block diagram- Electro Myogragh (EMG) – Block diagram- EMG recorder- Computer Tomography (CT) principle- Block diagram of CT scanner.	6

Text Books

1. Medical Physics –John R. Cameron and James G.Skofronick, 1978, John Willy & Sons.

Reference Book

1. Bio medical instrumentation – E D II, Dr M. Arumugam, Anuradha Agencies 1997.

Web Resources:

https://aapm.onlinelibrary.wiley.com/journal/24734209

https://www.medicalphysics.org/

Course Outcomes:

On completion of the course the learner will be able

CO 1: To learn the internal architecture and working principle of various instruments used in medical field.

CO 2: Students will be able to use Laser, Ultra sound and microwaves for different diagnosis and Therapeutic applications

CO 3: To design and develop a new abutments that may be comparable to currently available esthetic implant abutments.

CO 4: To make the students to familiarize physical design , Maintenance of different biomedical instrument used in medical field

CO 5: The student can able to design different laser spectrometers and devices for spectroscopic analysis and imaging of cells and tissues.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	M	S	S	S
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	S	M	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Skill Based Course -III	**STATISTICS**	**Course Code: PUS2**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 2**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To bring out the subjects related with the collection of data and computed statistical data which help students to acquire knowledge in these topics. • Demonstrate knowledge of probility and the standard statistical distribution • Demonstrate knowledge of fixed-sample and large-sample statistical properties of point and intervals estimates. • Demonstrate the ability to apply perform complex data management and analysis. • Demonstrate understanding of how to design experiments and surveys for efficiency.	
UNIT	**CONTENT**	**HOURS**
I	**Arithmetic Mean:** Formulae for calculating arithmetic mean in a frequency distribution-Merits and Demerits Simple Problems (ungrouped data, grouped data with equal class interval).	6
II	**Median:** Concept: Merits and Demerits-Simple Problems (ungrouped data, grouped data with equal class interval).	6
III	**Mode :** Concept: Merits and Demerits-Simple Problems (ungrouped data, grouped data with equal class interval).	6
IV	**Prediction using curve fitting &correlation analysis:** Curve fitting – methods of least square – fitting a straight line, parabola. Correlation –Rank correlation – Coefficient of Correlation.	6

V	**C Programming** 1. Find the arithmetic mean. 2. Find the median. 3. Find the mode. 4. To fit a Straight line. 5. To fit a Parabola curves. 6. To calculate simple correlation coefficient. **7.** To calculate Rank correlation coefficient.	6

Text Book :

1. 1.Study Material Prepared by – Dept. of Physics.
2. V.Rajaraman, Computer Oriented Numerical Methods.

Reference Books:

1. Gupta and Kapur , Fundamentals of Mathematical Statistics.
2. E.Balagurusamy, C Programming.

Web Resources:

https://www.statistics.com/

https://www.merriam-webster.com/dictionary/statistics

Course Outcomes:

On completion of the course the learner will be able

CO 1: Organize, manage and present data.
CO 2: Analyse statistical data using measures of central tendency dispersion and location
CO 3: Analyse statistical data graphically using frequency distribution
CO 4: Use discrete and continuous probability distributions, including mean, median, mode
CO5: cumulative frequency distribution.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	M	M	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	S	M	M	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Skill Based Course -III	STATISTICAL INFERENCE	Course Code: PUS2
Instruction Hours: 6	Credits: 6	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives	• To bring out the subjects related with hypothesis and simple problem. • Demonstrate knowledge of small sample test • Demonstrate knowledge of fixed-sample and large-sample statistical properties of point and intervals estimates. • Demonstrate understanding of how to test significance of observed sample. • To calculate and apply measures non-parametric test

UNIT	CONTENT	HOURS
I	Statistical hypothesis – simple and composite, Null and Alternative hypothesis, Critical region, Level of significance, type of errors and Power of test (simple problems). Steps involved in testing of hypothesis. Neymann Pearson Lemma (statement and proof).	18
II	Large sample test – Test for single proportion, difference between proportions, single mean, difference between means and difference between standard deviation.	18
III	Small sample test – student's 't' test – test for single mean, difference between means, paired 't' test and observed sample correlation co-efficient.	18

IV	Snedecor's F test – test for equality of two population variance – Testing the significance of an observed multiple correlation co-efficient, observed sample correlation ratio and linearity of regression (concepts only).	18
V	Non-parametric test - Chi-square test - Independence of attributes and goodness of fit. One sample tests – Sign test and Run test for randomness, Two sample tests – Sign, median and Mann Whitney U-test – Simple Problems.	18

Text Book:

1. Gupta.S.C. and Kapoor V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
2. Rohatgi.V.L, "An introduction to probability theory and Mathematical Statistics", Wiley Eastern limited.

Book for Reference:

1. Radhakrishna Rao C., "Linear Statistical Inference and its Applications", Wiley Eastern limited.
2. Lehmann.E.L, Testing of Statistical Hypothesis, John Wiley.
3. Gibbons.J.D , Non – Parametric Statistical Inference, Duxbury

Web Resources:

https://www.statistics.com/

https://www.merriam-webster.com/dictionary/statistics

Course Outcomes:

On completion of the course the learner will be able

CO 1: Analyse the subjects related with hypothesis and simple problem.

CO 2: Demonstrate the knowledge of small sample test

CO 3: Applying the knowledge of fixed-sample and large-sample statistical properties of point.

CO 4: To Analyses the intervals estimates.

CO 5: Understanding of how to test significance of observed sample.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	M	S	S	S	M	M	S	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	M	M	M	S
CO5	S	S	M	S	S	S	M	S	M	S

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Semester-VI / Core Course-XI	**NUCLEAR PHYSICS**	**Course Code: PUK**
Instruction Hours: 6	**Credits: 6**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create
Course Objectives	• To emphasize the understanding of nuclear forces and models, elementary particles and Accelerators. • To understand the properties of nucleus reactivity. • To gain knowledge on particle detectors and accelerators. • To describe radioactivity and related phenomena. • To understand the fission and fusion reaction and their applications.

UNIT	CONTENT	HOURS
I	**General Properties of Nuclei and Nuclear Models** Constituents of nuclei-Classification of nuclei - Nuclear mass and binding energy - Binding energy and stability of nucleus, Mass defect and Packing fraction, Binding fraction Vs Mass number curve - Nuclear size - Nuclear spin-nuclear energy levels - Nuclear magnetic moment --Parity of nuclei - Nuclear forces. Nuclear Models - Liquid drop model, Semi-empirical mass formula - Shell model- Salient features of shell model.	18
II	**Radioactivity** Radioactive decay law-Half life and Average life - Activity or strength of a radio – sample - Successive transformation - Radioactive chain- Radioactive equilibrium - Radioactive dating - α- decay - Geiger-Nuttall law - Tunnel effect - Gamow's theory of α decay - β-decay - - Neutrino hypothesis - Properties of neutrino - Gamma rays-origin of the gamma rays - Internal conversion.	18

III	**Particle Accelerators and Detectors** Linear accelerator – Cyclotron – Betatron - Electron synchrotron - Accelerators in India. Radiation Detectors - Ionisation Chamber - Proportional counter – G.M. Counter-Cloud chamber - Scintillation counter - Solid state track detector –Semiconductor detector.	18
IV	**Nuclear Reactions and Nuclear Reactors** Nuclear reactions - Types of nuclear reactions – Conservation laws in nuclear reactions -Energetic of nuclear reactions - Kinematics of nuclear reactions -Threshold energy of nuclear reactions - Solution of the Q- value equation - Cross-section of nuclear reactions. Nuclear fission - fission of light nuclei - Prompt and delayed neutrons - Neutron speed , classifications - Nuclear chain reaction - Nuclear reactor - Types of reactor -Fission bomb - Nuclear power in India- Fusion-Thermonuclear reaction - Hydrogen bomb -Possibility of fusion reactor.	18
V	**Elementary Particles** Classification of elementary particles – Pions and Muons - K-mesons – Hyperons- Conservation laws - Exact laws - Approximate conservative laws- Fundamental interactions – Antiparticles -Resonance particles – Hyper-nucleus - Symmetry classification of elementary particles - Quark model.	18
VI	**ANY THREE:** Collective Model of Nucleus Comparison of Alpha, Beta and Gamma decays Study of nuclear reactions and thermionic emission Comparison of all elementary particles	Assignment

Text Books:

1. M L Pandya& R. P .S .Yadav, *Elements of Nuclear Physics,* Kedaar Nath& Ram Nath ,2000.
2. S. N. Ghoshal, *Nuclear Physics* , S. Chand & Co., Edition ,2003. –unit-(IV,III)

Reference Books:

1. K. Ilangovan, *Nuclear Physics, Unit-(I,II,V).*
2. Satya Prakash, *Nuclear Physics*, A Pragati Prakasan Publication, 2011.
3. Jahan Singh, *Fundamentals of Nuclear Physics*, A Pragati Publication, 2012.
4. D.C. Tayal, *Nuclear Physics*, Himalaya Publishing House, 2009.

Web Resources:

https://www.nature.com/subjects/nuclear-physics

https://nptel.ac.in/courses/115/104/115104043/

Course Outcomes:

On completion of the course the learner will be able

CO 1: Explain nuclear properties compare crop of liquid with that of a nucleus and understand shell model.

CO 2: Distinguish between principles and working of different types of detectors, counters and accelerators.

CO 3: Describe basic radioactivity calculate half-live and understand radiation hazards.

CO 4: Explain natural and artificial transmutations, calculate Q-value of a reaction, recognize the applications of isotope

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	M	**S**	**S**	S	S	M	S

S - Strongly Correlated

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Semester-VI / Core Course IX	**CLASSICAL AND QUANTUM PHYSICS**	**Course Code: PUL**
Instruction Hours: 6	**Credits: 6**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To know the facts and develop a unified and logical treatment of the subject matter with clarity and conciseness. • To distinguish between 'inertia frame of reference' and 'non-inertial frame of reference. • To know how to impose constraints on a system in order to simplify the methods to be used in solving physics problems • To know what central, conservative and central-conservative forces mathematically understand the conservative theorems of energy, linear momentum and angular Momentum. • To know the importance of concepts such as generalized coordinates and constrained motion	
UNIT	**CONTENT**	**HOURS**
I	**Fundamental Principles and Lagrangian Formulation** Mechanics of a particle and system of particles – Conservation laws – Constraints – Generalized coordinates – Principle of virtual work-D' Alembert's principle and Lagrange's equation – Hamilton's principle – Lagrange's equation of motion.	18
II	**Hamilton"s Formulation** Hamilton's canonical equations of motion – Hamilton's equations from variational principle –Principle of least action – Phase space – Generalized momentum – Cyclic co-ordinates –Conservation theorem for generalized momentum – Conservation theorem for energy.	18

III	**Dual Nature of Matter** De Broglie concept of matter waves – De Broglie wavelength – Wave velocity and group velocity for the De Broglie waves – Experimental study of matter waves – Davison and Germer experiment – G.P. Thomon's experiment for verifying De Broglie relation – Heisenberg's uncertainty Principle – Electron microscope – Gamma ray microscope.	18
IV	**Basics of Quantum Mechanics** Basic postulates of wave Mechanics – Development of Schrödinger wave equation – Time independent and dependent forms of equations – Interpretation And Condition On wave function – Orthogonal and normalized wave function Eigen function and eigen values – Expectation values and Ehrenfest's theorem.	18
V	**Exactly Solvable Quantum Systems** Linear harmonic oscillator – Particle in a box – Rectangular barrier potential –Rigid rotator – Hydrogen atom.	18
VI	**ANY THREE:** Principle and Working of resonant tunneling diode Study of phenomenon of quantum tunneling through Potential barrier Study of classical computers and computing Discussion of swing of a ball in air using Bernouille's theorem Study of dynamics of motion and its relations to force	Group Discussion

Text Books:

1. S.L.Gupta., V. Kumar and H.V.Sharma, PragathiPrakasan, Classical Mechanics Educational Publisher, Meerut, 25th edition, 2011. UNIT-(I,II)
2. Murughesan, R., Modern Physics, S.Chand& Co., New Delhi, 2006.UNIT(III,IV,V)

Reference Books:

1. Arthur Beiser, Concept of Modern Physics: McGraw Hill Ed. V (1999).
2. H.Goldstein, Classical Mechanics, Narosa Book distributors, New Delhi 1980.

3. N.C.Rana and P.S.Joag, Classical Mechanics, Tata Mc Graw Hill, New Delhi 1991.
4. P M. Mathews and K. Venkatesan, A Text Book of Quantum Mechanics ,Tata Mc Graw Hill, New Delhi, 1987.

Web Resources:

https://nptel.ac.in/courses/122/106/122106034/

https://www.nature.com/articles/373469a0.pdf?origin=ppub

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Course Outcomes:

On completion of the course the learner will be able

CO 1: After taking this course students will be able to appreciate the beauty of quantum mechanics. They will be knowing all types of representations of operators and ways to apply them in different problems.

CO 2: The most important thing students learned from this course was how to solve the hydrogen atom problem by using quantum mechanics.

CO 3: Describe and understand the motion of a mechanical system using Lagrange Hamilton formalism.

CO 4: Describe and understand the motion of the forces in non inertial systems

CO 5: Understand and explain the differences between classical and quantum mechanics.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	M	S	S	S	M	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	S	S	S	S	S	M	S

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Semester – VI / Core Practical IV	**MAJOR PRACTIAL IV**	**Course Code: PUMY**
Instruction Hours: 6	**Credits: 5**	**Exam Hours: 3**
Internal Marks - 40	**External Marks - 60**	**Total Marks: 100**

Course Objectives:

- To indentify the basic electronic devices like diode, transistor, led,ujt and scr.
- To observe the characteristics of diodes like PN, Zener diode.
- To Know diode as a rectifier and adding filters to see the ripple free output.
- To observe the characteristics of transistors, SCR & UJT.
- To analyze transistor amplifiers and their frequency responses

LIST OF EXPERIMENTS

SECTION – A

(Any Eight Experiments)

1. Regulated power supply using Zener diode - Percentage of regulation.
2. Single stage - RC coupled amplifier – Transistor.
3. Transistor CB
4. Transistor CE
5. Half Adder and Full adder circuits using logic gates.
6. Half Subtractor and Full Subtractor circuits using logic gates.
7. NAND &NOR as Universal Gates
8. Emitter follower amplifier - Frequency response.
9. Colpitt's oscillator using transistor.
10. Astable multi-vibrator using Transistor/op.amp.
11. Flip Flop –RS & RS latch

SECTION – B

MICROPROCESSOR 8085. (Any Two)

1. 8-bit addition and 8-bit subtraction.
2. 8-bit multiplication and 8-bit division.
3. Conversion from decimal to hexadecimal system.
4. Conversion from hexadecimal to decimal system.

Course Outcomes:

On completion of the course the learner will be able

CO 1: Understand the diode and transistor characteristics.

CO 2: Verify the rectifier circuits using diodes and implement them using hardware.

CO 3: Design the biasing circuits like self biasing.

CO 4: Design various amplifiers like CE, CC, common source amplifiers and implement

CO 5: Remember the concepts of unipolar junction transistor and observe its characteristics.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	M	S	S	S
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	S	M	M	S

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Semester-VI/ Major Based Elective II	MATERIALS SCIENCE	Course Code: PUE4
Instruction Hours: 5	Credits: 5	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To develop knowledge in material science and to understand the relationship between properties and material characteristics. • This course provides students an understanding of basic structure and crystal arrangement of materials, the phase diagrams, advantages of heat treatment and the method of heat treatment processes, powder metallurgy processes. • The need and application of composite materials. • Introduce the concept of structure property relations. • Develop intuitive understanding of the subject to present a wealth of real world engineering examples to give students a feel of how material science is useful in engineering practices.	
UNIT	**CONTENT**	**HOURS**
I	**Crystal Structure** Types of crystals-space lattice-basis- unit cell and lattice parameters – Bravais lattices-Lattice planes and Miller indices-inter planar spacing in a cubic lattice-cubic lattice-SC – BCC – FCC- Sodium chloride and Diamond crystal structure – Bonding of solids (Ionic , Covalent , Metallic , Hydrogen).	18
II	**Mechanical Behavior of Materials** Different mechanical properties of engineering materials – creep – Fracture-technological properties – factors affecting mechanical properties	18

	of material-Heat treatment-cold and hot working-types of mechanical tests-metal forming process- deformation of metals-Deformation of crystals and polycrystalline materials.	
III	**Super Conducting Materials** Superconductivity – Properties-Meissner's effect- London equations - types of superconductors Type I and Type II –High temperature superconductors -Josephson effects and its applications – SQUIDS - Applications of superconductor- BCS Theory (Basic Idea).	18
IV	**Nano Materials** Types of nano materials 1D ,2D ,&3D -Properties of nanomaterials (size dependent) -synthesis of nanomaterials- Fullurenes-Application of nanomaterials – Carbon nanotubes- Fabrication and structure of carbon nano tubes - Properties of carbon nano tubes (Mechanical and Electrical) - Applications of CNT's.	18
V	**Smart Materials** Metallic glass and its applications — Fiber reinforced metals – SAW Materials and its applications – Biomaterials – Ceramic-Nuclear engineering materials-Nanophase materials - SMART materials-Conducting polymers- Optical materials - Fiber optic materials and their applications.	18

Text Books :

1. M. Arumugam, *Material science*, Anuradha puplishers, 1990.
2. Manasikark are-nanotechnology Fundemendals and Applications, I.K International house publishing,2011.

Reference Books:

1. V. Raghavan, *Material Science and Engineering*, Printice Hall India.,2004.
2. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi, 2001.

Web Resources:

https://www.sciencedaily.com/terms/materials_science.htm

https://www.ox.ac.uk/admissions/undergraduate/courses-listing/materials-science

Course Outcomes:

On completion of the course the learner will be able

CO 1: Upon completion of this course the student will be able to:
CO 2: Identify the properties of metals with respect to crystal structure and grain size
CO 3: Interpret the phase diagrams of materials
CO 4: Classify and Distinguish different types of cast irons, steels and non ferrous alloys.
CO 5: Describe the concept of heat treatment of steels & strengthening mechanisms

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	M	S	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	M	S	S	S	M	M	S
CO5	S	S	M	S	S	S	S	M	M	S

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M - Moderately Correlated

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N – No Correlation

Semester-VI / Major Based Elective II	**Nano Materials and Applications**	**Course Code: PUE4**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To understand the theoretical concepts involved in crystal growth and thin film sciences and to learn the basic characterizing techniques of materials. • To foundational knowledge of the Nanoscience and related fields. • To make the students acquire an understanding the Nanoscience and Applications • To help them understand in broad outline of Nanoscience and Nanotechnology. • For Nanomaterials understood the principles and Characterization Techniques	
UNIT	**CONTENT**	**HOURS**
I	**Back ground of Nano technology** Scientific revolution-Emergence of Nano technology, Challenges in Nano technology –Periodic Table, Atomic structures, Molecules and Phases-Energy, Atomic size, surfaces and dimensional space.	15
II	**Preparation of Nano Materials** Nano Material-Preparation-Top down-ball milling,Nano lithography-Bottom up, Self Assembly -Sol gel -Hydro thermal method.	15
III	**Carbon Nano Structures** Carbon molecules and carbon bond - C60: Discovery and structure of C60 and its crystal -- Superconductivity in C60.	15

IV	**Carbon Nanotubes** Carbon nanotubes: Fabrication – Structure – Electrical properties – Vibrational properties – Mechanical properties -- Applications (fuel cells, chemical sensors, catalysts).	15
V	**Applications** Molecular electronics and nanoelectronics – Nanorobots -- Biological applications of nanoparticles - Catalysis by gold nanoparticles.	15

Text Book:

1. ManasiKarkare,Nano Technology Fundamentals and App1ications.
2. K.InternationalPublishing House Limited.
3. CharlesP.PooleJRAnd Frank Owens."Introductionto Nanotechnology"Wiley,2003.

Reference Books

1. B.B.Laud,NonLinear Optics,2ndEdn.NewAge International (P)Limited.Delhi,1991.
2. RobertW.Boyd, Non Linear Optics, 2ndEdn.AcademicPress,Newyork,2003.

3 K.Ravichandran, K.Swaminathan,B.SakthivelC.Pavidoss Introduction to Characterization of Nano Material and Thin Films(Publication JAZYM Publication)

Web Resoruces

www.math.ox.ac.uk

www.math.upenn.edu**.**

Mathematical Physics-A Modern Intro to its Foundations-

S.Hassani(Springer,1999)WW.pdf

Course Outcomes:

On completion of the course the learner will be able

CO 1: Learn about the background on Nanoscience
CO 2: Understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment
CO 3: Apply their learned knowledge to develop Nanomaterial's.
CO 4: Choose appropriate synthesis technique to synthesize quantum nanostructures of desired size, shape and surface properties.
CO 5: Appreciate enhanced sensitivity of nanomaterial based materials and their novel applications in industry

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	M	S	S	S	M	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester- VI / Major Based Elective III	**COMMUNICATION PHYSICS**	**Course Code: PUE5**
Instruction Hours: 6	**Credits: 6**	**Exam Hours: 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	**K-1** Acquire/Remember **K-2** Understand **K-3** Apply **K-4** Analyze **K-5** Evaluate **K-6** Create	
Course Objectives	• To promote scientific temper among students and update the basic functioning of various communication systems. • To be highly skilled, interdisciplinary professionals who can identify and solve engineering problems from unusually broad physical perspectives. • To engage vigorously in further studies in interdisciplinary graduate programs and a wide variety of other lifelong learning opportunities. • To pursue careers that incorporate ethical and professional responsibility, as well as good citizenship. • Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena.	
UNIT	**CONTENT**	**HOURS**
I	**UNIT I Radio transmission and reception** Transmitter-modulation-need for modulation- types of modulation-amplitude,frequency and phase modulation- modulation factor-sideband frequencies in AM wave-limitations of amplitude modulation - frequency modulation-block diagram of AM and FM Transmitter. Receiver- demodulation-AM & FM radio receivers-super heterodyne radio receiver.	18
II	**UNIT II Fiber Optic Communication** Introduction –structure of optical fiber –total internal reflection in optical fiber – principal and propagation of light in optical fiber -	18

	acceptance angle - numerical aperture – types of optical fibers based on material – number of modes – refractive index profile - fiber optical communication system (block diagram) - fiber optic sensors – Temperature sensor – fiber optic endoscope.	
III	**UNIT III Radar Communication** Basic radar system -Radar range –Antenna scanning – Pulsed radar system - A-Scope- Plan position indicator- Tracking radar- Moving target indicator- Doppler effect-MTI Principle- CW Doppler Radar- Frequency modulator CW Radar.	18
IV	**UNIT IV Satellite Communication** Introduction – history of satellites – satellite communication system – satellite orbits – classification of satellites – types of satellites – basic components of satellite communication – constructional features of satellites- multiple access – communication package – antenna- power source – satellite foot points- satellite communication in India.	18
V	**UNIT V Mobile Communication** GSM – mobile services- concept of cell – system architecture – radio interface – logical channels and frame hierarchy – protocols – localization and calling – Handover- facsimile (FAX) – application – VSAT (very small aperture terminals) – Modem – IPTV (internet protocol television) – Wi-Fi - 3G ,4G (Basic ideas only).	18

Text Books:

1. Metha V.K., *Principles of Electronics*, S. Chand & Company Ltd., 2013
2. Anokh Singh and Chopra A.K., *Principles of communication Engineering*, S. Chand & Company PVT. Ltd., 2013.
3. Mani I. P., *A text book of Engineering Physics*, Dhanam Publications, Chennai-42, 2014.

Reference Books:

1. PoornimaThangam I, *Satellite communication*, Charulatha Publications, 2012.
2. Dennis Roddy and John Coolen, *Electronic Communication*, PHI, 1990.
3. William C.Y. lee, *Cellular telecommunication* (second edition), Tata Mcgraw hill, 1991.

Web Resources:

https://publons.com/journal/65968/communications-physics/

https://vjs.ac.vn/index.php/cip

Course Outcomes:

On completion of the course the learner will be able

CO 1: Students will demonstrate an understanding of core knowledge in Physics, including the major premises of classical mechanics, Example and Modern Physics.

CO 2: Students will demonstrate written and oral communication skills in communicating physics-related

CO 3: Students will demonstrate understanding of the applications of numerical techniques for modeling physical systems for which analytical methods are inappropriate or of limited utility.

CO 4: Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena.

CO 5: Students will demonstrate an understanding of the impact of Physics and Science on society.

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**M**	**S**
CO2	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO3	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO4	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO5	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**

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M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester VI / Major Based Elective III	COMPUTER ORGANIZATION AND ARCHITECTURE	Course Code: PUE5
Instruction Hours: 6	Credits: 5	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K-1 Acquire/Remember K-2 Understand K-3 Apply K-4 Analyze K-5 Evaluate K-6 Create	
Course Objectives	• To promote scientific temper among students and update the basic functioning of various communication systems. • To understand the principles of digital computer logic circuits and their design. • To understand the working of a central processing unit architecture of a computer • Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena.	
UNIT	**CONTENT**	**HOURS**
I	Number Systems – Decimal, Binary, Octal and Hexadecimal Systems – Conversion from one system to another – Binary Addition, Subtraction, Multiplication and Division – Binary Codes– 8421, 2421, Excess-3, Gray, BCD – Alphanumeric Codes – Error Detection Codes.	18
II	Boolean Laws and Theorems – Boolean Expressions – Sum of Products – Product of Sums – Simplification of Boolean Expressions – Karnaugh Map Method (up to 4 Variables) – Implementation of Boolean Expressions using GateNetworks.	18
III	Combinational Circuits – Multiplexers – Demultiplexers – Decoders – Encoders – Arithmetic Building Blocks – Half and Full Adders – Half and Full Subtractors – Parallel adder –2's Complement Adder – Subtractor – BCD Adder.	18

IV	Sequential Circuits – Flip Flops – RS, JK, and Master-Slave Flip Flops –Shift Register – Counters – Asynchronous, MOD-n and Synchronous Counters – BCD Counter –Ring Counter.	18
V	Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control – Reduced Instruction Set Computer – CISC characteristics – RISC Characteristics.	18

Text Books:

1. Donald P. Leach, Albert Paul Malvino and GoutamSaha, Digital Principles and Applications, TataMcGraw Hill, Sixth Edition, Third Reprint, 2007.

Unit:I : Chapter-5 Section (5.1-5.8)

Unit:II : Chapter-2 Section (2.1-2.2), Chapter-3 Section (3.1, 3.2, 3.5, 3.7)

Unit: III: Chapter-4 Section (4.1-4.3, 4.6), Chapter-6 Section (6.7, 6.8)

2. Thomas C. Bartee, Digital Computer Fundamentals, Tata McGraw-Hill, Sixth Edition, Twenty Fifth Reprint, 2006.

Unit:III : Chapter-5 Section (5.1, 5.3, 5.10, 5.11) Unit:IV : Chapter-4 Section (4.1-4.9)

3. Morris Mano M, Computer System Architecture, Prentice Hall of India, Third Edition,2008.

Unit: I: Chapter-3 Section (3.5-3.6)

Unit: V: Chapter-8 Section (8.2-8.8)

Reference Book

1. Morris Mano. M, Digital Logic and Computer Design, Prentice Hall of India, 2008.
2. 2.Linda Null, Julia Lobur, The Essentials of Computer Organization and Architecture, Fourth Edition2014.

Web Resources:

https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/

https://onlinecourses.nptel.ac.in/noc21_cs61/preview

Course Outcomes:

On completion of the course the learner will be able

CO 1: Promoting scientific temper among students and update the basic functioning of various communication systems.
CO 2:Understanding the principles of digital computer logic circuits and their design.
CO 3: Understand the working of a central processing unit architecture of a computer
CO 4: Apply the analytical approach of physical phenomena.
CO 5: Promoting scientific temper among students and update the basic functioning of various communication systems.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation