



**PSGR KRISHNAMMAL COLLEGE FOR WOMEN**  
**College with Potential for Excellence**  
(An Autonomous Institution, Affiliated to Bharathiar University)  
(Reaccredited with 'A' Grade by NAAC, An ISO 9001:2008 Certified Institution)  
Peelamedu, Coimbatore-641004



## DEPARTMENT OF PHYSICS

**CHOICE BASED CREDIT SYSTEM**

**BACHELOR OF PHYSICS (B.Sc Physics)**

**2015-2018**

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**DEPARTMENT OF PHYSICS**  
**2015-2018**

Semester	Part	Subject Code	Title of the Paper	Instruction Hours/week	Contact hours	Duration of Examination	Examination Marks			Credits	
							CA	ESE	Total		
I	I	TAM1401/ HIN1401/ FRE1401	Language T/H/F Paper I	6	86	3	25	75	100	3	
	I I	ENG1501/ ENG15F1	Language Through Literature - Level I/ Language Through Literature - Functional Level I	6	86	3	25	75	100	3	
			Core Physics Paper I Heat, Properties of Matter and Sound	6	86	3	25	75	100	5	
	III	PS14C01	Core Physics Practical I		3		-	-	-	-	
				Allied Chemistry Paper –I/ Mathematical Statistics- I	4	56	3	20	55	75	4
				Allied Chemistry Practicals/ 	3		-	-	-	-	-
	IV	NME14B1/ NME14A1/ NME12WS / NME12GS/ NME12AS	Basic Tamil/ Advanced Tamil/ Women Studies/ Gandhian Studies/ Ambedhkar Studies	2	27	3	50/ 25/	50/ 75/ 100	100	2	
I	I	TAM1402/ HIN1402/ FRE1402	Language T/H/F Paper II	6	86	3	25	75	100	3	
	I I	ENG1502/ ENG15F2	Language Through Literature - Level II Language Through Literature - Functional Level II	6	86	3	25	75	100	3	
	II I	PS14C02	Core Physics Paper II Mechanics and Mathematical Physics	5	71	3	25	75	100	4	
		PS09CP1	Core Physics Practicals – I	3		3	40	60	100	4	
		CE13A02/ TH11A05	Allied Chemistry Paper –II/ Mathematical Statistics -II	5	71	3	20	55	75	4	

		CE13AP1	Allied Chemistry Practicals	3		3	20	30	50	2
	I V	NME14B2 NME14A2 OPS1206	Basic Tamil/ Advanced Tamil/ Open Course	2	27	2	-	100	100	2
	V I	NM12GA W	General Awareness	Self Study			-	-	Grad e	-
III	I	TAM1403/ HIN1403/ FRE1403	Language T/H/F Paper III	6	86	3	25	75	100	3
	II	ENG1503 ENG15F3	Language Through Literature - Level III/ Language Through Literature - Functional Level III	5	71	3	25	75	100	3
	III	PS13C03	Core Physics Paper III Electricity and Magnetism	4	56	3	25	75	100	4
		PS08CP2	Core Physics Practical – II	3		-	-	-	-	-
		TH13A09A PL12A01 AS12A01	Allied Mathematics for Science – I Allied Botany Paper- I Allied Zoology Paper I	7 4 4	101	3 3 3	25 20 20	75 55 55	100 75 75	5 4 4
	IV	SB11MD01 SB12BC01 SB12BA01 SB12AC01	<b>Skill Based Elective</b> Multimedia and DTP software- Level I <b>Basics Of Computer Application</b> Business Application Software – I <b>BUSINESS AUTOMATION</b> Fundamentals of Business Automation <b>APPLICATIONS WITH C</b> C with Data Structures	3						
		SB11MDP 1 SB08BAP1 SB12BSP1 SB08ACP1	<b>Skill Based Elective Practicals</b> Multimedia and DTP software- Practical I MS Office- Practical I Business Application Software – I C with Data Structures Practicals-I							
		NM14VHR	Value Education	2	27	3	25	75	100	2

	VI		Job Oriented Course PCB Fabrication Techniques	After 3.00P M		3	-	-	Grade	-
IV	I	TAM1404/ HIN1404/ FRE1404	Part I Language T/H/F Paper IV	5	71	3	25	75	100	3
	II	ENG1504/ ENG15F4	Language Through Literature - Level IV / Language Through Literature - Functional Level IV	6	86	3	25	75	100	3
	III	PS13C04	Core Physics Paper IV Fundamentals of Digital Electronics	4	56	3	25	75	100	4
		PS08CP2	Core Physics Practicals – II	3		3	40	60	100	4
		TH13A14 PL12A02 AS12A02	Allied Mathematics for science -II Allied Botany Paper- II Allied Zoology Paper II	7 4 4	101	3 3 3	25 20 20	75 55 55	100 75 75	5 4 4
		PL11AP1 AS11AP1	Allied Botany Practicals Allied Zoology Practicals	3 3		3 3	20 20	30 30	50 50	2 2
	IV	SB11MD01 SB12BS01 SB12BA01 SB12AC01 SB12WD0 1	<b>Skill Based Elective</b> Multimedia and DTP software- Level I <b>Basics Of Computer Application</b> Business Application Software Level I Business Automation- Level I Applications with C- Level I Basics of web designing- Level I	3		3	25	75	100	3
		SB11MDP 1 SB12BAP1 SB12BSP1 SB12ACP1 SB12WDP 1	<b>Skill Based Elective Practicals</b> Multimedia and DTP software- Level I Practical I Office package- Level I Practical I Business Application Software Level I Practical– I Applications with C Level I Practical I Basics of web designing Level I practical			3	40	60	100	2
		NM10EVS	Environmental Studies	2	27	3	25	75	100	2
			Internship (4 Weeks)	-		-	-	100	100	2

	V		NSS/NCC/ /YRC/ SPORTS&GAMES	-		-	-	100	100	1
V	III	PS13C05	Core Paper V Electronics	6	86	3	25	75	100	5
		PS13C06	Core Paper VI Solid state physics	6	86	3	25	75	100	5
		PS13E01 PS12E02 PS12E03	Elective : 1.Programming in 'C' 2. Materials Science – I Bio medical Instrumentation -I	4	56	3	25	75	100	5
		NM13IS 2	Information Security	2	27	3				
		PR0J	Project	3			25	75	100	5
		PS12AC 1	#Advanced Learners' Course I – Energy Physics- I	-			-	10 0	100 *	*5
		PS12AC 2	#Advanced Learners' Course I – Experimental techniques and data Analysis - I	-			-	10 0	100 *	*5
		SB11M D02  SB12BS 02  SB12BA 02 SB12AC 02 SB12W D02	<b>Skill Based Elective</b> Multimedia and DTP software-Level II <b>Basics Of Computer Application</b> Business Application Software Level II Business Automation- Level II Applications with C- Level II Basics of web designing- Level II	3						4
		SB11M DP2  SB12BA P2	<b>Skill Based Elective Practicals</b> Multimedia and DTP software- Level II Practical II Accounting package-							2

		SB12BS P2 SB12AC P1 SB12W DP1	Level II Practical II Business Application Software Level II Practical– II Applications with C Level II Practical II Basics of web designing Level I practical II							
		PS10CP 3	Core Physics Practicals – III	6	86	4	40	60	100	4
			Comprehensive Exam	-			-	-	-	Grade
			Supportive Course	-				-	-	Submi ssion of certifi cate
VI	II I	PS13C0 7	Core Paper VII Optics and Spectroscopy	5	71	4	25	75	100	5
		PS13C0 8	Core Paper VIII Quantum Mechanics and Relativity	5	71	4	25	75	100	5
		PS13C0 9	Core Paper IX Atomic and Nuclear Physics	5	71	4	25	75	100	5
		PS13E0 4 PS12E0 5 PS12E0 6	Elective : 1 Microprocessor 2. Materials Science - II Bio medical Instrumentation -II	6	86	4	25	75	100	5
		PS12AC 3	#Advanced Learners’ Course II - Energy Physics- II	-			-	10 0	100 *	*5
		PS12AC 4	#Advanced Learners’ Course II –	-			-	-	100 *	*5

			Experimental techniques and data Analysis - II							
		PS09CP 4	Core Physics Practicals- IV	6	86	4	40	60	100	4
		SB11M D02	<b>Skill Based Elective</b> Multimedia and DTP software –Level II	3			25	75	100	4
		SB08BC 02	<b>Basics Of Computer Application</b> Business Application							
		SB08BA 02	Software – II <b>BUSINESS AUTOMATION</b>							
		SB08AC 02	Internet and e-commerce <b>APPLICATIONS WITH C</b> C with Graphics							
		SB11M DP2	<b>Skill Based Elective Practicals</b> Multimedia and DTP software-				40	60	100	2
		SB08BC P2	Practical II <b>Basics Of Computer Application</b>							
		SB08BA P2	Business Application Practicals– II <b>BUSINESS AUTOMATION</b>							
		SB08AC P2	Tally and Internet C with Graphics practicals-II							

**GRAND TOTAL 3800 140+10<sup>#</sup>**

\* Not considered for Grand Total and CGPA

## QUESTION PAPER PATTERN

### CORE PAPERS

**Continuous Internal Assessment : 50 Marks**

SECTION	MARKS	TOTAL
A – 5/8 X 2 Marks	10	50
B – 4/6 X 5 Marks	20	
C – 2/3 X 10 Marks	20	

**End Semester Examination : 100 Marks**

SECTION	WORD LIMIT	MARKS	TOTAL
A- 5/8 X 2 Marks	two or three sentences	10	75
B – 5 X 5 Marks		25	
C - 5/7 X 8 Marks		40	

### ADVANCED LEARNERS COURSE (ALC)

**Continuous Internal Assessment : 20 Marks**

SECTION	MARKS	TOTAL
A – 4 / 6 X 4 Marks	16	25
B – 1 / 2 X 9 Marks	9	

**End Semester Examination : 75 Marks**

SECTION	MARKS	TOTAL
A-5/8X5=25 Marks	25	75
B – 5/8X10=50 Marks	50	



## INFORMATION SECURITY

### Continuous Internal Assessment : 50 Marks

SECTION	MARKS	TOTAL
A – 5 / 8 X 2 Marks	10	40
B – 6 / 8 X 5 Marks	30	

### Project and Viva Voce

A specific problem will be assigned to students or they will be asked to choose a problem. The Topic/area of work will be finalized at the end of III semester allowing scope for students to gather relevant literature during the vacation. The project work is to be carried out at the department or any other organization approved by the staff coordinator and the HoD, Review meeting will be conducted once in a month. Viva Voce presentation will be conducted by the external examiner and the staff coordinator guiding the project.

### Methodology

Each project should contain the following details

- Introduction
- Literature Survey
- Theory / Experimental details
- Results and Discussion
- Conclusion
- Bibliography

The above content should not exceed 100 pages.

### Evaluation

#### Internal Evaluation : 20 Marks

Review	Mode of Evaluation	Marks	Total
I	Selection of the field of study, topic & literature collection	5	20
II	Research design & data collection	10	
III	Analysis & conclusion Preparation of rough draft	5	

#### External Assessment : 80 Marks

Mode of Evaluation	Marks	Total
Project Report		

Relevance of the topic to the academic / society	10	60
Objectives	10	
Experimental design	20	
Expression of results and discussion	20	
<b>Viva voce</b>		
Presentation	10	20
Discussion	10	

**WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF  
CONTINUOUS INTERNAL ASSESSMENT**

**Theory**

	CIA I	CIA II	Model Exam	Assignment/ Class Notes	Seminar	Attendance	Max. Marks
Core	4	4	5	4	5	3	25
ALC		10	15	-	-	-	25
Cyber Security	40	40		10			100

**Practical**

	Model Exam	Lab Performance	Regularity in Record Submission	Attendance	Maximum Marks
Core	12	20	5	3	40

<b>Semester</b>	:	<b>I</b>	
<b>Core</b>	:	<b>1</b>	
<b>Title</b>	:	<b>HEAT, PROPERTIES OF MATTER AND SOUND</b>	
<b>Subject Code</b>	:	<b>PS14C01</b>	
<b>Credits</b>	:	<b>5</b>	<b>Lecture Hours:86</b>

**Objective:**

This paper deals with state of real gases, entropy, production of low temperature and liquefaction of gases, thermal radiation and sound.

**UNIT I (17 Hrs)**  
**Quantum Theory of Specific Heat**

Dulong and Petit's law and the deduction – failure of Dulong and Petit's law – Einstein's theory and its limitation – Debye theory – specific heat of diatomic gases

**Entropy**

Principle of increase of entropy; temperature – entropy diagram – entropy of a perfect gas- Thermo dynamic potentials- internal energy (U)- Helmholtz function (F)- Gibb's function (G) and enthalpy (h) – Maxwell's thermodynamics relations– the (T-dS) equations.

**UNIT II (17 Hrs)**  
**Thermal Radiation**

Quantum theory of radiation- Planck's hypothesis – average energy of Planck's oscillator – Plank's radiation law and its experimental verification – \*Wien's law -Rayleigh- Jean's in relation to Planks law – Stefan's constant and Wien's constant from Plank's law \*

**Statistical Thermodynamics**

Statistical equilibrium – Probability theorems in statistical thermodynamics– Maxwell's Boltzmann distribution law- Maxwell's Boltzmann distribution in terms of temperature – Maxwell quantum statistics – phase space – Fermi-Dirac distribution law –Bose Einstein distribution law – \*Comparison of the three statistics\*.

**UNIT III ( 17 Hrs)**  
**Production of Low Temperature and Liquefaction of Gases**

Methods of production of low temperatures – Joule Thomson effect – Porous plug experiment – its theory and result – Joule Thomson effect for perfect and real gases – \*super fluidity – Helium I and Helium II –Lambda point- adiabatic demagnetization-Theory & Experiment.

**UNIT IV (17 Hrs)**

### **Elasticity**

Bending of beams – uniform and non uniform bending – bending moment of a bent beam –  
\*cantilever- static and dynamic methods – torsion in a wire-Couple per unit twist – rigidity  
modulus determination by static and dynamic methods\*

### **Surface Tension**

Surface Tension and Production and Measurement of Low Pressures - Surface tension and surface  
energy – pressure on curved surface of a liquid – variation of surface tension with temperature –  
Jaeger’s method – laws of diffusion – diffusion pump – Pirani and Knudsen gauge

## **UNIT V**

**(18 Hrs)**

### **Determination of Frequency of Vibration of a Source of Sound**

Different methods for determination of frequency – direct and graphical – by chronography –  
stroboscopic methods – strobosconne- phonic wheel method – resonance method – Sonometer –  
Helmholtz resonator – method of beats – Siren – means of Lissajous figures

### **Ultrasonics**

Ultrasonics –Production –detection and applications.

## **TEXT BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Brijlal Subramaniam	Heat and Thermodynamics	S. Chand and Co.	16 <sup>th</sup> edition 2012
<b>2</b>	Mathur D.S	Elements of of properties of matter	Shyamla Charitable Trust	1 <sup>st</sup> edition 1987
<b>3</b>	Saighal.R.L	A Textbook of Sound	S.Chand &Co Ltd	1 <sup>st</sup> edition 1973

## **REFERENCE BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Mathur D.S	Fundamentals of Heat	Sultan Chand & Sons	2 <sup>nd</sup> edition 1970
<b>2</b>	Murugesan. R	Properties of matter, Sound and thermal physics	S. Chand & Co Ltd	1 <sup>st</sup> edition 2011

<b>3</b>	Rajam .J.B	A text book of Heat	Triveni Publications	5 <sup>th</sup> edition 1957
<b>4</b>	Singhal.S.S, Agarwal. J.P. and Sathyaprakash	Heat, Thermodynamics and Statistical Physics	Pragati Prakashan	9 <sup>th</sup> edition 1985

<b>Semester</b>	:	<b>II</b>	
<b>Core</b>	:	<b>2</b>	
<b>Title</b>	:	<b>MECHANICS AND MATHEMATICAL PHYSICS</b>	
<b>Subject Code</b>	:	<b>PS14C02</b>	
<b>Credits</b>	:	<b>4</b>	<b>Lecture Hours:71</b>

**Objective:**

To give the students fundamental ideas of rotational and vibrational motion of rigid bodies, classical, Lagrangian mechanics and Mathematical physics

**Unit I** **(14 Hrs)**

**Conservation Law** – Impulse – Impact – Direct and oblique impact – Final velocity and loss of kinetic energy – Motion of a particle in a vertical circle – friction – Laws of friction – angle of friction – resultant reaction – cone of friction – Equilibrium of a body on a rough inclined plane to the horizontal and when the inclination is greater than the angle of friction.

Rigid body – rotational and vibrational motion – Torque – moment of inertia – radius of gyration- kinetic energy of rotation- M.I. of a fly wheel- Experimental determination – Precession – The gyrostat – gyrostatic applications – M.I. of a diatomic molecule – its rotational energy states.

**Unit III** **(14 Hrs)**

**Elementary Principles of classical mechanics**

Constraints and degrees of freedom – Generalized co-ordinates – Generalized displacement- velocity – acceleration – momentum – force – potential D’Alembert’s principle

**Lagrangian mechanics**

Lagrangian differential equation from D’Alembert’s principle – Applications of Lagrange’s equation of motion to linear harmonic oscillator – simple pendulum compound pendulum

**Unit IV** **(14 Hrs)**

**Hamiltonian Mechanics**

Phase space – Hamiltonian function – Hamilton principle-Hamiltonian canonical equation of motion – physical significance of H– application of Hamiltonian equation of motion to simple pendulum- compound pendulum and linear harmonic oscillator

**Unit V**  
**Special Functions**

**(15 Hrs)**

Beta and Gamma functions – relation between Beta and Gamma functions-Different forms of Beta and Gamma functions – Evaluation of  $\Gamma(1/2)$ ,  $\Gamma(3/2)$ ,  $\beta(1,2)$ ,  $\beta(2,1)$  -Bessel functions – equation - series solution- simple problems only.

**TEXT BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Gupta, Kumar & Sharma	Classical Mechanics (Unit III & IV)	Pragati Prakashan	19 <sup>th</sup> edition 2012
<b>2</b>	Mathur D.S	Mechanics (Unit II)	S.Chand & Co Ltd	1 <sup>st</sup> edition 2013
<b>3</b>	Murugesan. R	Properties of Matter (Unit – I)	S. Chand & Co Ltd	1 <sup>st</sup> edition 2013
<b>4</b>	Sathya Prakash	Mathematical Physics (Unit-V)	Sultan Chand & Sons	3 <sup>rd</sup> edition 2013

<b>Semester</b>	<b>:</b>	<b>II</b>
<b>Practical Lab</b>	<b>:</b>	<b>1</b>
<b>Title</b>	<b>:</b>	<b>CORE PRACTICALS I</b>
<b>Sub Code</b>	<b>:</b>	<b>PS09CP1</b>
<b>Credits</b>	<b>:</b>	<b>4</b>

**Practical Hours: 90**

**Objectives:**

To impart to students practical knowledge of the use of measuring instruments and to make them verify the basic laws in Properties of matter, Sound, Heat, Optics, Electricity and Magnetism.

**List of Experiments**

1. Young's Modulus- Non Uniform bending- Optic lever
2. Young's Modulus- Uniform bending – pin and microscope.
3. Rigidity modulus- Static torsion
4. Rigidity modulus and moment of inertia – Torsion pendulum.
5. A.C. Frequency- Sonometer.
6. Acceleration due to gravity – Compound pendulum
7. Co-efficient of thermal conductivity- Lee's disc method
8. Refractive index of a solid prism- Spectrometer
9. Refractive index of a liquid prism- Spectrometer
10. Wavelength of a spectral lines – grating – minimum deviation method using Spectrometer
11. Calibration of a low range voltmeter- Potentiometer
12. Calibration of a low range ammeter- Potentiometer
13. Resistance by Potentiometer
14. Moment of a magnet - deflection magnetometer –Tan C method.
15. Moment of a magnet – Circular coil- deflection magnetometer
16. Temperature co-efficient of resistance of a Thermistor



**Open Course:**

**Semester** : **II**  
**Title** : **MEDICAL INSTRUMENTATION**  
**Subject Code** : **OPS1206**  
**Credits** : **2** **Lecture Hours:27**

**Objective:**

To give an Outline of the principles of physics used in medical laboratory Techniques.

**UNIT I**

**X-ray instrumentation (5 Hrs)**

X-rays - Basic definitions- Generation of ionizing radiation- Detection of radiationInstrumentation for Diagnostic X-rays- Visualization of X-rays-X-ray machines- radiation therapy.

**UNIT II**

**Electrocardiography (5 Hrs)**

Electrocardiography (ECG)- Origin of Cardiac action-ECG lead configurations-Bipolar limb leads-Augmented unipolar limb leads-Unipolar chest leads-Frank lead system-Practical considerations for ECG recording-Analysis of Recorded ECG Signals.

**UNIT III (5 Hrs)**

**Physiological assist devices**

Physiological assist devices-Pacemakers-Energy requirements to excite heart muscle- Methods of stimulation-External pacemaker and internal pacemaker-Artificial heart valvesRequirements for the design of artificial heart valves-Different natural heart valves-Different types of heart valves-Problems regarding artificial heart valves.

**UNIT IV**

**Safety instrumentation (6 Hrs)**

Introduction -Radiation safety instrumentation-Effects of radiation exposure-Radiation monitoring instruments-Pocket dosimeter –Film dosimeter-Thermo luminescence dosimeter— Micro shock and Macro shock-Electrical accidents in hospitals.

**UNIT V****(6 Hrs)****Bio-telemetry & Computers in medicine**

Elements of Bio-telemetry system –Design of Bio-telemetry system – Uses of Biotelemetry-  
Computers in medicine.

**TEXT BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Leslie Cromwell	Biomedical Instrumentation & Measurements (Unit I)	Prentice Hall	2 <sup>nd</sup> edition 1992
<b>2</b>	Arumugam. M	Biomedical Instrumentation (Units II,III, IV & V)	Anuradha Publications	1 <sup>st</sup> edition 2007

**REFERENCE BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Khandpur	Handbook of Biomedical Instrumentation	Tata Mc Graw Hill	2 <sup>nd</sup> edition 2008

<b>Semester</b>	:	<b>III</b>	
<b>Core</b>	:	<b>3</b>	
<b>Title</b>	:	<b>ELECTRICITY AND MAGNETISM</b>	
<b>Subject Code</b>	:	<b>PS13C03</b>	
<b>Credits</b>	:	<b>4</b>	<b>Lecture Hours:56</b>

**Objective:**

To give the students the ideas about Electro-statistics, magnetic properties of matter, thermo electricity, Helmholtz equation of varying currents and Maxwell's equation and electromagnetic waves.

**UNIT I**

**(11 Hrs)**

**AC circuit analysis**

Analysis of the AC circuits (with vector diagrams) containing (i) resistance and inductance, (ii) \*capacitance and resistance\* and (iii) resistance, inductance and capacitance, LCR series resonance circuit, LC parallel\* and L, R and C parallel resonance circuits, power consumed by the above circuits, Q factor and bandwidth of response of a tuned circuit, sharpness of resonance.

**UNIT II**

**(11 Hrs)**

**Thermo electricity**

\*Seebeck effect, laws of thermo emf\*, Peltier effect, Peltier co-efficient, determination of peltier co-efficient at a junction, thermodynamical consideration of Peltier effect, Thomson effect, Thomson co-efficient, emf generated in a thermocouple taking both Peltier effect at the junctions and Thomson effect in the metals, thermoelectric power, application of thermodynamics to thermocouple, thermoelectric diagrams and their uses.

**UNIT III**

**(12 Hrs)**

**Electrostatics**

**Gauss theorem and its applications:**

Gauss's law, application of Gauss law - Electric field due to uniformly charged sphere, Electric field due to an isolated uniformly charged conducting sphere, Electric field due to uniform infinite cylindrical charge, Electric field due to an infinite plane sheet of charge, Field due to two parallel sheets of charge, Coulomb's theorem, energy stored in unit volume of an electric field.

### Capacitance and capacitors:

Spherical capacitor, cylindrical capacitor, force of attraction between charged plates of a capacitor, change in the energy of a parallel plate capacitor when the distance between the plates is altered and when a dielectric slab is introduced between the plates.

## UNIT IV

(11 Hrs)

### Magnetic properties of materials

Electron theory of magnetism, divergence of B and curl of B, Properties of the magnetic field B, dia, para and \* ferromagnetism\* antiferromagnetism and ferrites, Magnetic field (B), magnetization (M), magnetic field intensity (H), magnetic susceptibility and magnetic permeability, magnetic materials and magnetization, magnetic hysteresis, area of the hysteresis loop,

## UNIT V

(11 Hrs)

### Maxwell's equations and electromagnetic theory

Maxwell's equations - Maxwell's equations in free space-Electromagnetic waves in free space-Electromagnetic waves in isotropic Non-conducting media (dielectrics)-refractive index Solutions of the Wave Equations-Impedance of dielectric media-Energy density of Electromagnetic wave and Poynting theorem.

\* Self study

## TEXT BOOKS

S.No	Author	Title of Book	Publisher	Year of Publication
1	Murugesan R	Electricity and Magnetism (Units I,II,III &IV)	S. Chand & Company Ltd	5 <sup>th</sup> edition 2013
2	Tewari K.K	Electricity and Magnetism Unit V	S. Chand & Sons	14 <sup>th</sup> edition 2012

## REFERENCE BOOKS

S.No	Author	Title of Book	Publisher	Year of Publication
1	Brijlal and N.Subrahmanyam	Electricity and Magnetism	Ratan Prakashan Mandir	12 <sup>th</sup> edition 2012

<b>2</b>	Duggal B.D.& Chhabra C.L	Fundamentals of Electricity and Magnetism	Shoban Lal Nagin Chand & Co.,	4 <sup>th</sup> edition 1985
<b>3</b>	Sehgal, Chopra and Sehgal	Electricity and Magnetism	Sultan Chand & Sons	4 <sup>th</sup> edition 1986
<b>4</b>	Vasudeva D.N	Electricity and Magnetism	S. Chand & sons	11 <sup>th</sup> edition 1988

**Add on Course:**

**Semester : III**

**Title : PCB FABRICATION TECHNIQUES**

**Credits : 2**

**Lecture Hours:40**

**Objective:**

To make the students understand PCB design tools and use them practically.

**UNIT I (8 Hrs)**

Introduction- designing schematic-editing schematic page- making connection – add text and graphics – editing properties- managing part libraries- making parts- processing of design- printing set up capture to view design

**UNIT II (8 Hrs)**

Introduction- creating a new design- placing components- working with foot prints – thermal relief And zones- using fan out- manual routing- auto routing

**UNIT III (8 Hrs)**

Auto routing- resolving problems- finishing the design- post process setting- single side PCB's multilayer PCB's- using auto eco- inter tool communication- auto placement – enhanced routing – violation setting

**UNIT IV (8 Hrs)**

Route strategies- route setting- system setting – auto back up- jumper setting – free via matrix setting – test post setting – post process setting

**UNIT V (8 Hrs)**

Component place board- component place array- free via matrix- un place board – pad stack setting- drill setting- layer setting- component renaming

**TEXT BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Walter C. Bosshart	Printed circuit boards design and technology	TMH publication	1 <sup>st</sup> edition 2000
<b>2</b>	Kandpur R.S	PCB	TMH publication	Reprint 2008

<b>Semester</b>	:	<b>IV</b>	
<b>Core</b>	:	<b>4</b>	
<b>Title</b>	:	<b>FUNDAMENTALS OF DIGITAL ELECTRONICS</b>	
<b>Subject Code</b>	:	<b>PS13C04</b>	
<b>Credits</b>	:	<b>4</b>	<b>Lecture Hours:56</b>

**Objective:**

This paper aims at exposing the students to the fundamentals of digital electronics, flipflops, registers, counters and semiconductor memory.

**UNIT I**

**Number Systems, Logic gates and Boolean algebra (11 Hrs)**

Number Systems-Binary-octal-Hexadecimal and its conversions-Binary Codes- BCD codes- 8421 code-Excess 3 code-Grey code-\*Logic gates – AND, OR, NOT, NAND, NOR gates\* – Boolean algebra- operators – logic expressions De-Morgan’s theorem – laws and rules of Boolean algebra – truth table – reducing Boolean expressions – Karnaugh maps – simplification of digital circuits.

**UNIT II**

**Arithmetic circuits and Flip flops (11 Hrs)**

\*Half adder- full adder\* – Parallel binary adder, half subtractor – full subtractor – Parallel binary Subtractor, parity generator – encoder – decoder.

Flip flop – RS Flip Flop- Edge triggered RS Flip Flop, D and T Flip Flop - JK Flip Flop, Master Slave Flip Flop.

**UNIT – III**

**Registers and Counters (11 Hrs)**

Registers – Shift registers-Shift left and Shift right registers – Ring Counter – Johnson’s Counter - Asynchronous / Ripple counters – modulus counter- Decade counter - Synchronous Counters.

**UNIT – IV**

**A/D & D/A Converters (11 Hrs)**



Digital to Analog (D/A) converter- Binary weighted resistor method – R / 2R Ladder Network - Analog to Digital (A/D) Converter – counter type - Dual slope integrator – successive approximation A/D Converter.

**UNIT – V**

**(12 Hrs)**

**Semiconductor memory**

Read only memory – Random access memory – PROM – EPROM-SRAMs -DRAMs. Digital IC Characteristics –Resistor Transistor Logic (RTL) – Transistor Transistor Logic (TTL) – Schottky TTL – Emitter Coupled Logic (ECL).

**\* Self Study**

**TEXT BOOKS**

S.No	Author	Title of Book	Publisher	Year of Publication
1	Malvino & Leach	Digital principles and applications	Tata Mc Graw Hill	6 <sup>th</sup> edition 2008
2	M. Morris Mano	Digital Logic & Computer Designs	Prentice Hall India.	4 <sup>th</sup> edition 1999
3	Vijayendran V	Introduction to Integrated electronics	S.Viswanathan (Printers Publishers, Chennai)	2011 Reprint 2005

**REFERENCE BOOKS**

S.No	Author	Title of Book	Publisher	Year of Publication
1	Chatterji B.N	Digital Computer technology	Khanna Publishers, Delhi	2 <sup>nd</sup> edition 1990
2	Puri V K	Digital Electronics circuits and systems	Tata McGraw Hill Publishing Company Limited New Delhi	1 <sup>st</sup> edition 1997

**Semester : III & IV**

**Practical Lab** : 2  
**Title** : CORE PRACTICALS II  
**Sub Code** : PS08CP2  
**Credits** : 4

**Practical Hours: 90**

**Objective:**

To make the students obtain practical knowledge and to make them verify the basic laws in Properties of matter, Optics, Electricity and Digital electronics

**List of Experiments**

1. Young's Modulus –Uniform Bending – Koenig's Method
2. Young's Modulus – Non- Uniform Bending – Koenig's Method
3. Wave length of Mercury Spectral Lines – Grating - Normal Incidence – Spectrometer
4. i-d curve-  $\mu$  of the prism- Spectrometer
5. Dispersive Power of a Grating &Wave length of Mercury Spectral Lines by minimum deviation method -Spectrometer-
6.  $\mu$  of lens – Newton's rings method
7. Thickness of a thin wire – Air Wedge method
8. Calibration of a High Range Voltmeter – Potentiometer
9. EMF of thermocouple – Potentiometer
10. High resistance by Charging - Ballistic Galvanometer
11. High Resistance By leakage – Ballistic Galvanometer
12. Comparison of Mutual Inductances – Ballistic Galvanometer
13. Verification of Truth Tables of IC Gates: OR, AND, NOT, XOR, NOR, and NAND
14. Verification of Demorgan's theorems using Logic Gates
15. Verification of Truth Tables of Half and Full Adders

16. Verification of Truth Tables of Half and Full Subtractor

17. Verification of NAND as a Universal Block

18. Verification of NOR as a Universal Block

<b>Semester</b>	:	<b>V</b>	
<b>Core</b>	:	<b>5</b>	
<b>Title</b>	:	<b>ELECTRONICS</b>	
<b>Subject Code</b>	:	<b>PS13C05</b>	
<b>Credits</b>	:	<b>5</b>	<b>Lecture Hours:86</b>

**Objective :**

To enable the students to gain knowledge in Network theorems, and to help them to acquire the basic ideas of electronic devices and to learn about the working and analysis of electronic circuits and communication systems.

**UNIT I**

**Electronic Devices: (17 Hrs)**

Zener diode-Tunnel diode- Bipolar junction Transistor: \*Characteristics- CE modegraphical analysis of CE configuration-collector leakage current\* -Field Effect transistor - V-I characteristics- FET parameters-MOSFET – SCR Basic ideas – characteristics - Triac – Construction - Operations – Characteristics -Applications. The Diac – Operations – Applications of Diac – Lamp dimmer heat control. Unijunction transistor – Constructions – Operations - equivalent circuit of UJT – Characteristics of UJT- UJT relaxation oscillators.

**UNIT II (17 Hrs)**

**Amplifiers:**

Voltage Amplifiers: Low frequency h-parameter equivalent circuit-Mathematical analysis of common emitter amplifier using hybrid parameters -Linear analysis of an amplifier circuit- multi stage amplifiers -RC coupled amplifier- gain frequency response-input and output impedanceequivalent circuit at low, medium, and high frequencies- Principle of negative feed back-gainreasons for negative feedback- \*emitter follower\*.

**Operational amplifier:** Basic concepts- \*Ideal Operational Amplifier\*- Inverting OP-AMP - Non inverting OP-AMP-Characteristics- Differential amplifier-advantage &weakness of differential amplifier-CMRR- OP-Application : inverting amplifier as adder-differentiator-\*integrator\*.

**UNIT III****(17Hrs)****Oscillators:**

Barkhausen criteria for self sustained oscillations-Hartley oscillator –frequency and condition for sustained oscillations-Colpitt’s oscillator –frequency and condition for sustained oscillations-crystal oscillator- Astable, monostable and bistable Multivibrators- - Phase shift oscillators- Analysis - Wien bridge oscillator – Analysis.

**UNIT IV****(17Hrs)****Modulation & Reception of radio waves**

Frequency modulation (FM): Characteristics of FM wave – analysis of FM wave –power relation in FM wave-frequency spectrum of FM wave-band width of FM wave--- phase modulation (PM)- comparison of AM, FM and PM; definition –analysis-*\*comparison with FM\** Pulse Amplitude Modulation(PAM), Pulse Width Modulation(PWM), Pulse Position Modulation (PPM).

**UNIT V****(18Hrs)****Fiber Optic Communication**

Fiber construction-Application of Fiber cables. - Propagation of light waves in an optical fibre – Acceptance angle and Acceptance cone of a fibre – Numerical Aperture (NA) – NA of a graded Index Fibre – Classification of Optical fibers –Step index Fiber- Step index Monomode Fiber- Graded index Multimode Fiber– Light sources: LED-Structures of LED-LED materials - semiconductor Laser diode LED – The process involved in LEDS – Modulation bandwidth and Spectral Emission of LEDS. - Detectors: PIN photo detector.

**\* Self Study****TEXT BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Dennis Roddy &John Coolen	Electronic Communication	PHI	4 <sup>th</sup> edition 1995
<b>2</b>	George Kennedy & Bernard Devis	Electronic Communication systems (Unit IV)	Tata McGraw-Hill	28 <sup>th</sup> reprint 2005

3	Mehta V.K & Rohit Mehta	Principles of Electronics ( Unit I,II&III)	Tata McGraw Hill Publishing Company Limited New Delhi	11 <sup>th</sup> edition 2012
4	Millman and Halkias	Integrated Electronics (Unit II)	Tata Mc Graw Hill	41 <sup>st</sup> reprint 2005
5	R S Sedha	Applied Electronics (Unit I)	S.Chand	24 <sup>th</sup> reprint 2004
6	Subir Kumar Sarkar	Optical Fibers and Fiber Optic Communication Systems ( Unit V)	S.Chand &Co	2 <sup>nd</sup> edition 2001

#### REFERENCE BOOKS

S.No	Author	Title of Book	Publisher	Year of Publication
1	Bernard Grob	-Basic electronics	Tata McGraw-Hill	2 <sup>nd</sup> edition 2007
2	Gupta & Kumar	Hand Book of Electronics	Pragati Prakashan	32 <sup>nd</sup> revised edition 2001

<b>Semester</b>	:	<b>V</b>	
<b>Core</b>	:	<b>6</b>	
<b>Title</b>	:	<b>SOLID STATE PHYSICS</b>	
<b>Subject Code</b>	:	<b>PS13C06</b>	
<b>Credits</b>	:	<b>5</b>	<b>Lecture Hours:86</b>

### **Objective:**

The objective of this paper is to enable the students to understand the inter atomic forces and bonding in solids, crystallography, and superconductivity and its applications.

### **UNIT I**

**(18Hrs)**

#### **Bonding in Solids and Elementary Crystallography**

**Bonding in Solids:** Introduction –Interatomic forces and cohesive energy – Different types of bonds in solids-Primary bonds-Ionic or Electrovalent bond-Calculation of bond energy of NaCl molecule-Properties of ionic solids-Covalent bond-Different types of covalent crystals-Properties of covalent solids-\*Difference between ionic and Covalent solids\*-Metallic bonds-Properties of metallic solids-Secondary bonds- Dispersion bond-Properties of dispersion bonded solids-Dipole bond-Properties of Dipole bonded solids-Hydrogen bond- Lattice energy of ionic crystals – Calculation of Madelung constant of ionic crystals

#### **Elementary Crystallography**

Introduction- \*fundamental definitions in Crystallography\*-Lattice parameters of an unit cell-Primitive cell- Bravais lattices- crystal structures of important engineering materials and stacking sequences- coordination number- -density of packing- sc, bcc , fcc and hcc structures- diamond cubic structure-Zinc blend structure-Sodium Chloride structure- Caesium Chloride structure- Polymorphism and Allotropy

### **UNIT II**

**(17 Hrs)**

#### **Crystal Planes and defects in crystals**

Introduction –Nomenclature of crystal directions - Nomenclature of crystal planes–Miller indices – Important features of Miller indices of crystal planes – Procedure for finding Miller indices Perpendicular distance between two parallel planes in a cubic crystal lattice-Important features of Miller Indices

Crystal imperfections – \*point defects\* – Effect of point imperfections –Formation of point defects– Conversion factor-Number of vacancies at any temperature- Number of Schottky defects or Frenkel defects at any temperature –Other ways of production of point defects-Line defects – Edge dislocation-Screw dislocation-Effect of dislocations on the properties of solids- comparison of edge dislocation and screw dislocation Surface defects –External and internal surface imperfections-Volume defects

### **UNIT III**

#### **Electron theory of Metals:**

**(17 Hrs)**

Introduction, - the Classical Free electron theory – Electrical conductivity of a metal based on Drude Lorentz theory - Electrical conductivity before steady state- Relaxation Time ,Collision time and mean free path-success of free electron theory-Breakdown of classical theory-The quantum free electron theory-Electron energies in metals-- Electrical conductivity of a metal from quantum free electron theory - Fermi-Dirac distribution function and its variation with temperatureDensity of states-Band theory of solids-Electron in a periodic potential - Kronig Penney model of periodic potential Effective mass of electron and concept of hole--factors affecting conductivity of conductors-\*Derivation of Ohm's law\* – Thermal Conductivity- Derivation of Coefficient of Thermal Conductivity due to Conduction electrons-Wiedemann Franz law.

### **UNIT IV**

**(17 Hrs)**

#### **Dielectric Properties**

Introduction- Fundamental definitions in dielectrics-Different types of electric polarization-frequency and temperature effects on polarization-Dielectric loss-Frequency dependence of dielectric constant-local; field or internal field-Clausius Mossoti relationDetermination of dielectric constant and dipole moment of a dielectric material-Dielectric breakdown-Different types of dielectrics-Essential requirements of a good insulating materialClassification of insulating materials-\*Applications of insulating and dielectric materials\*

### **UNIT V**

**(17Hrs)**

#### **Superconductivity**

Introduction – Explanation for the occurrence of superconductivity – \*General properties of superconductors\*-Meissner effect-Type I and Type II superconductors- London equations and penetration depth- energy gap in superconductors –Superconductors in A.C fields Thermodynamics of



superconductors –BCS theory - Quantum tunneling- Josephson tunneling – D.C and A.C  
Josephson’s effect - Applications of superconductors

**\* Self Study**

**TEXT BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	M. Arumugam	Solid state Physics (Units I to IV)	Anuradha agencies	1st edition 2007
<b>2</b>	Pillai .S.O	Solid state Physics Unit V	New age International Private Limited	6 <sup>th</sup> edition 2011

**REFERENCE BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Dekker	Solid state Physics	Macmillan & Co limited	1 <sup>st</sup> edition 2011
<b>2</b>	Gupta and Kumar	Solid state Physics	K.Nath & Co	8 <sup>th</sup> edition 1992
<b>3</b>	Kittel	Solid state Physics	Wiley student edition	7 <sup>th</sup> edition 2010

**Elective:**

<b>Semester</b>	<b>:</b>	<b>V</b>	
<b>Title</b>	<b>:</b>	<b>PROGRAMMING IN C</b>	
<b>Subject Code</b>	<b>:</b>	<b>PS13E01</b>	
<b>Credits</b>	<b>:</b>	<b>5</b>	<b>Lecture Hours:56</b>

**Objective:**

The objective of introducing this paper is to give the students a working knowledge of one of the most popular and widely used programming languages of modern days, namely 'C' language.

**UNIT I (11 Hrs)**

**Introduction to C**

Importance of C- \*C character set\*- C tokens-Key words and identifiers-constants- variables - data types and sizes- declaration of variables –Assigning valued to the variables – Defining symbolic constants.

**UNIT II (11 Hrs)**

**Operators and Expressions**

\*Arithmetic operators - relational and logical operators-assignment operators \*- increment and decrement operator-Conditional operator-Bit wise and Special operator - Arithmetic expression-Evaluation of expression – Precedence of arithmetic operations-Type conversion in expressions- Operator precedence and some computational problems.

**UNIT III**

**Statements and Loops (11 Hrs)**

IF Statement – \*IF ELSE Statement\*- Nesting IF ELSE Statements- Switch Statements- the?: Operator- GOTO Statements-While Statements – DO statements – For Statements- Jumps in loops

**UNIT IV 12 Hrs**

**Arrays and Structures:**

One Dimensional array- Two dimensional Array- Initializing two-dimensional Array- Multidimensional arrays- Dynamic Arrays. Structure definition – Giving values to members- Structure initialization – \*Comparison of structure variables\*- Arrays of Structures – Arrays within Structure – Structure with in Structures- Structures and Functions

**UNIT V**

**(11 Hrs)**

**Pointers in C**

Understanding Pointers-Accessing the address of a variable- Declaring and Initializing Pointers- Accessing a variable through its pointer- Chain of pointers -\*Pointer expressions\* – Pointer increments and Scale factor-Pointers and Arrays-Pointers and Character Strings- Pointers to Functions- Pointers and Structures.

**\* Self Study**

**TEXT BOOKS**

S.No	Author	Title of Book	Publisher	Year of Publication
1	Balagurusamy	Programming in ANSI C	Tata McGraw-Hill Publishing Company Limited	13 <sup>th</sup> edition Reprint 2006

**REFERENCE BOOKS**

S.No	Author	Title of Book	Publisher	Year of Publication
1	Byran gottfried	Programming with C	Tata McGraw-Hill Publishing Company Limited	13 <sup>th</sup> edition 1996
2	Yeswanth Kanethkar	Let Us C	BPB Publications	6 <sup>th</sup> edition 2002

**Elective:**

<b>Semester</b>	<b>:</b>	<b>V</b>	
<b>Title</b>	<b>:</b>	<b>MATERIALS SCIENCE PAPER I</b>	
<b>Subject Code</b>	<b>:</b>	<b>PS12E02</b>	
<b>Credits</b>	<b>:</b>	<b>5</b>	<b>Lecture Hours:56</b>

**Objective:**

The objective of this paper is to introduce the students to electron theory of solids and different types of materials based on their properties.

**UNIT I**

**Electron Theory of Solids (11 Hrs)**

Introduction-the classical free electron theory and the quantum free electron theory- Electron energy in metals and Fermi energy- density of states- anti-symmetric nature of the wave functions of the Fermi system – explanation of covalent bonding in crystals- electron in a periodic potential- \*energy bands in solids\*- Brillouin zones – distinction between metals, insulators and semiconductors- effect mass of electron and concept of hole – the Hall effect.

**UNIT II (11 Hrs)**

**Conducting materials**

Introduction- atomic interpretation of ohms law- relaxation time and electrical conductivity – relaxation time – collision time- mean free path- heat developed in a current carrying conductor- sources of resistivity of metals and alloys- \*thermal conductivity\*- Wiedemann Franz law- thermal expansion- electrical conductivity at high frequencies- geometrical and magnetic field effects on electrical conductivity- variation of electrical resistivity due to mechanical stress (strain gauge)- different types of conducting materials.

**UNIT III (11 Hrs)**

**Dielectric materials**

Introduction- fundamental definition in dielectric – \*different types of electric polarization- frequency and temperature effects on polarization\*- dielectric loss- local field or internal field – Clausius- Mossotti relation – determination of dielectric constant – dielectric break down- properties and different types on insulating materials – Ferro electric materials

**UNIT IV****(11 Hrs)****Magnetic materials**

Introduction- \*different type soft magnetic materials\* – classical theory of dia magnetism (Langevin theory)- Langevin theory of para magnetism- Weiss theory of para magnetism- Weiss of Ferro magnetism (molecular field theory on field magnetism) – Heisenberg interpretation on internal field and quantum theory of ferromagnetism- domain theory of Ferro magnetism- hard and soft materials

**UNIT V****(12 Hrs)****Superconducting materials**

Introduction- explanation for the occurrence of super conductivity – \*general properties of super conductors\*- other general observations- types of superconductors- applications of superconductors. \* **Self Study**

**TEXT BOOKS**

S.No	Author	Title of Book	Publisher	Year of Publication
1	Arumugam. M	Material Science	Anuradha agencies- Kumbakonam	1 <sup>st</sup> edition Revised 1990

**REFERENCE BOOKS**

S.No	Author	Title of Book	Publisher	Year of Publication
1	Raghavan	Materials and engineering	Prentice Hall of India	3 <sup>rd</sup> edition 1990
2	Vijaya & Rangarajan	Materials Science	Tata McGraw Hill Publishing Company Ltd	1 <sup>st</sup> edition 2005
3	Raghavan	Materials Science	Prentice Hall	13 <sup>th</sup> edition 1990

**Elective:**

**Semester** : V

**Title** : **BIO MEDICAL INSTRUMENTATION -PAPER I**

**Subject Code** : **PS12E03**

**Credits** : **5** **Lecture Hours:56**

**Objective:**

The objective of this paper is to introduce the students the basic knowledge of transducers, recorders and other bio medical instruments and devices.

**UNIT I** **(11 hrs)**

**Electrodes and transducers**

Transducers for medical applications-Active transducers-Passive transducers-Electrode theory-Components of biomedical instrument system-electrodes- microelectrodes-\*chemical electrodes\*

**UNIT II** **(11 hrs)**

Different types of transducers-\*Magnetic induction type\*-piezoelectric type-thermoelectric type-capacitive transducers-inductive transducers- linear variable differential transformer

**UNIT III** **(11 hrs)**

**Biopotential Recorders-I**

Cardiovascular instrumentation-characteristics of recording system-electrocardiography-origin of cardiac potentials-P,R,T,S-T,Q waves-\*ECG lead configurations\*-ECG recording set up Practical considerations for ECG recording-

**UNIT IV** **(11 hrs)**

**Biopotential Recorders-II**

Analysis of ECG signals-Phonocardiography-Heart sounds-Physical characteristics of heart sounds-Recording set up-Relationship between the heart sounds and function of the cardiovascular system-Medical applications-special; \*applications of phonocardiogram\*  
Electroencephalograph(EEG) -recording of evoked potentials-electromyograph

**UNIT V****(12hrs)****Physiological Assist devices**

Pacemakers-Pacemaker batteries-Artificial heart valves-Defibrillators-Nerve and muscle stimulators-\*Heart lung machine\*-Kidney machine. \* **Self Study**

**TEXT BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Arumugam. M	Biomedical Instrumentation (units II,III, IV & V)	Anuradha Publications	1 <sup>st</sup> edition 2007
<b>2</b>	James Cameron	Medical Physics (Units III , IV & V)	Wiley publications	1st edition 1978

**REFERENCE BOOKS**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Leslie Cromwell, Fred J Weibell and Erich A.Pfeiffer	Biomedical Instrumentation and Measurements	Prentice Hall of India	2 <sup>nd</sup> edition 1992

**Semester** : **V**  
**Title** : **INFORMATION SECURITY (LEVEL-II)**  
**Subject Code** : **NM13IS2**  
**Credits** : **2** **Lecture Hours:26**

**Objective:**

This course aims on introducing the theory and practice of designing and building secure computer systems that protect information and resist attacks. It covers all aspects of cyber security including network security, computer security and information security.

**UNIT I (5HRS)**

Information security: History of IS-What is security?-characteristic of IS-components of I system –security system life cycle model.

**UNIT II (6HRS)**

Cryptography: Concepts and techniques- plain text and cipher text- Encryption principles- Cryptanalysiscryptograph algorithm- Cryptograph tools

Authentication methods-passwords-keys versus passwords-Attacking Systems via passwords-Password verification

**UNIT III (5HRS)**

Fire walls: Viruses and worms- Digital rights management--What is firewalls- Types of Fire wall-Design Principles of Firewall

**UNIT IV (5HRS)**

Hacking: Hacker hierarchy-password cracking-Phishing- Network Hacking- Wireless hacking.-Windows hacking- Web hacking- Ethical hacking

**UNIT V (5 Hrs)**

Case studies: DNS, IP SEC- Social media



**TEXT BOOKS**

<b>S.no</b>	<b>Author</b>	<b>Title of book</b>	<b>Publisher</b>	<b>Year of publication</b>
1	Dr.Michael E. Whitman, Herbert J.	Principles and Practices of Information Security	Course Technology	4 <sup>th</sup> edition, 2012
	Mattord		Cengage Learning	
2	Atul Kahato	Cryptography and Network Security	McGraw Hill Education	3 <sup>rd</sup> Edition 2012
3	William Stallings	Network Security Essential Applications and standard	Prentice Hall	2 <sup>nd</sup> Edition 2009
4	Devan N. Shah	Information Security Principles and Practice	Wiley India	2009

<b>Semester</b>	: V
<b>Advance Level Course</b>	: 1
<b>Paper</b>	: 1
<b>Title</b>	: <b>ENERGY PHYSICS PAPER- I</b>
<b>Sub code</b>	: <b>PS12AC1</b>
<b>Credits</b>	: 5

**Objective:**

To make the students understand the basic principles and applications of different forms of energy.

**UNIT-I**

**Electrical Energy**

Application of heating effect of electricity: Electric heater– Electric radiation and Electric Iron – Electric welding and electric furnace –Carbon arc – Electric Lamp – Efficiency of a Lamp – Measurement of Electric Power - Principle of production of A.C. – A.C generators – D.C generators -D.C Motors.

**UNIT – II**

**Magnetic Energy**

Magnetic field (B), magnetization (M), magnetic field intensity H, Magnetic flux and flux density, magnetic materials and magnetization, Induction heater-magnetic hysteresis.

**UNIT III**

**Photovoltaics & Microwaves**

The photovoltaic effect -analysis of photovoltaic cells-efficiency of solar cells-design of photovoltaic system-single crystal and polycrystalline cells-Reflex Klystron- Magnetron - Microwave oven.

**Unit IV**

**Thermal Energy**

Distribution of Energy in the thermal spectrum – Lummer and Pringsheim Experiment and its Results – Wien's Displacement Law and Radiation Law – Rayleigh Jean's Law -Planck's Radiation Law – Deduction of Wien's Law and Rayleigh – Jean's Law from Planck's law-Kirchoff's Law of radiation and its proof.

## UNIT V

### Molecular Energy & Nuclear Energy

Maxwell's law of equipartition of Energy – Molar Specific heat capacity at constant volume and constant pressure – Total Internal Energy and Ratio of Heat capacities in monoatomic gas, Diatomic gas. Chain reaction-Controlled & uncontrolled Nuclear fission, energy released in atom bomb . Nuclear fusion-Thermo nuclear reactors- Hydrogen bomb.

### TEXT BOOKS

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	Brijlal Subramaniam	Heat and Thermodynamics Units I, &II	S.Chand and Co.	16 <sup>th</sup> edition 2012
2	Dennis Roddy &John Coolen	Electronic Communication (Unit III)	Prentice Hall India	4 <sup>th</sup> Edition 1995
3	Subir Kumar Sarkar	Optical Fibre and Fibre optic communication systems Unit III)	S Chand & Co	2 <sup>nd</sup> edition 2001
4	Singhal.S.S, Agarwal. J.P. and Sathya prakash	Heat, Thermodynamics and Statistical Physics Units I, &II	Pragati Prakashan	9 <sup>th</sup> Edition 1985
5	Subrahmaniam. N & Brijlal S	Atomic & Nuclear Physics Unit V	Chand & Company Ltd	3 <sup>rd</sup> Edition 2008

<b>Semester</b>	: V
<b>Advance Level Course</b>	: 2
<b>Paper</b>	: 1
<b>Title</b>	: <b>EXPERIMENTAL TECHNIQUES &amp; DATA ANALYSIS PAPER- I</b>
<b>Sub code</b>	: <b>PS12AC2</b>
<b>Credits</b>	: <b>5</b>

**Objective:**

To make the students understand the principles involved in measuring devices, error measurements, the standards of measurements, performance characteristics of an instrumentation system, transducers, and vibration sensing devices.

**UNIT – I**

**Basic Concept of Measurement & Transducers**

Introduction – System configuration – Problem Analysis – Basic Characteristics of measuring devices, Calibration.

Transducers: capacitive, transducer-Photoelectric effect –Photoconductive TransducersPiezoelectric transducers. Temperature and pressure transducers.

**UNIT – II**

**Measurement of errors:** accuracy, precision, Significant Figures –types of errors-Statistical Analysis-Probability of errors-limiting error

**UNIT – III**

**Standards of measurements:** classification of standards- Standards for Mass, Length and Volume-time and frequency standards, electrical standards, standards of temperature and luminous intensity.

**UNIT – IV**

**Performance Characteristics of an Instrumentation system**

Introduction – Generalized measurement – Zero order system – Second order system – Dead time element – Specification and testing of dynamic response.

## UNIT – V

### Vibration

Random Vibration – Shock – Analyzing vibration sensing devices – Generalized second order system – Absolute displacement – Absolute velocity and acceleration vibrating sensing devices – Velocity transducer – Banded strain gauge accelerators – Piezo electric accelerometer

### TEXT BOOKS

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	Hefnick .A.O and Cooper. W.D	Modern Electronic Instrumentation and Measurement Techniques Unit – II & III	Prentice Hall India Publications	16 <sup>th</sup> edition 1981
2	C.S. Rangan, G.R. Sharma and VSV Mani	Instrumentation Devices and Systems Unit – I, IV & V	Tata McGraw Hill Publications	2 <sup>nd</sup> edition 1983

**Semester** : **V**  
**Practical Lab** : **3**  
**Title** : **CORE PRACTICALS III**  
**Sub Code** : **PS10CP3**  
**Credits** : **4**

**Practical Hours: 90**

**Objectives:**

To make the students to obtain practical knowledge in ALP and OP-AMP applications and solar cells

**List of Experiments**

1. Determination of Absolute Mutual Inductance – Ballistic Galvanometer
2. Determination of Absolute Capacity- Ballistic Galvanometer
3. Cauchy's Constants using Spectrometer
4. Dispersive power of a prism using Spectrometer
5.  $\mu$  of a prism – Stokes formula – Spectrometer
6. Characteristics of Junction Diode
7. Characteristics of Zener Diode
8. Transistor Characteristics - Common Emitter Configuration
9. Characteristics of FET
10. Characteristics of UJT
11. R-C Coupled Amplifier – Single Stage
12. Emitter Follower
13. Voltage Doubler
14. Regulated low Range power supply
15. Hartley Oscillator - Solid State
16. Colpitt's Oscillator – Solid State
17. Closed loop Gain Op Amp (Inverting & Non inverting)

18. Op Amp as adder in inverting mode & Subtractor
19. Op Amp as Differentiator & Integrator
20. **Op Amp** - Astable Multivibrator
21. Characteristics of laser diodes
22. Study of characteristics of photodiode(solar cell)
23. Determination of efficiency of solar cells
24. Qualitative and Quantitative study of Chlorophyll II, Carbohydrates, proteins and Heavy metal ions.

<b>Semester</b>	:	<b>VI</b>	
<b>Core</b>	:	<b>7</b>	
<b>Title</b>	:	<b>OPTICS AND SPECTROSCOPY</b>	
<b>Subject Code</b>	:	<b>PS13C07</b>	
<b>Credits</b>	:	<b>5</b>	<b>Lecture Hours:71</b>

**Objective:**

This paper aims to impart a detailed knowledge of optics & Spectroscopy.

**UNIT I (14 Hrs)**

**Geometrical Optics**

Spherical aberration in lenses – reducing spherical aberration –Coma – Aplanatic lens- Oil immersion objective- \*Astigmatism\* –Curvature – Distortion – Dispersion – Angular and Chromatic dispersion – Combination of prisms to produce (i) dispersion – without deviation (ii) deviation without dispersion – Achromatism in lenses – Achromatic combination of lenses –(i) in contact (ii) and separated by a distance –Eye pieces-Ramsden’s and Huygen’s eyepiece.

**UNIT II**

**Interference (14 Hrs)**

Interference in thin films due to reflected and transmitted light – Fringes due to wedge shaped films – Newton’s rings- Determination of wavelength of light- Refractive index of liquid – Michelson’s interferometer- Applications – Determination of Wavelength, Thickness of a thin transparent films, Refractive index of gases – Fabry-Perot Interferometer – Antireflection coatings – Interference filters

**UNIT III (14 Hrs)**

**Diffraction**

Rectilinear propagation of light- Zone plate- action and construction- comparison with convex lens-\*Fraunhofer diffraction\* – Diffraction at single slit, double slit, Diffraction grating

**Polarization**



Double refraction – Huygen’s explanation in uniaxial crystals – production and detection of plane, circular and elliptically polarized light – Optical activity – Fresnel’s explanation – Laurent’s half shade polarimeter.

**UNIT IV**

**(14 Hrs)**

**Quantum Optics**

**Lasers**

Spontaneous and Stimulated emission – Einstein’s A & B coefficients, Population Inversion - Metastable states - Optical pumping- Modes of resonators and coherence length, Ruby & He – Neon lasers

**Holography**

Basic principle-Making a Hologram-Reconstruction of the image from the HologramMathematical theory-\*Applications of Holography\*-Holographic Interferometry & Microscopy

**UNIT V**

**(15 Hrs)**

**Spectroscopy**

Photoelectric effect-Laws of Photoelectric Emission-Einstein’s photoelectric equation - Compton effect - X ray spectra- \*Continuous and Characteristic spectra\* – Moseley’s law – Application – Molecular spectra – Spectra of diatomic molecules – Pure rotation spectra- Vibration, rotation spectra- Selection rules- \*Raman effect – Experimental study \*– Raman effect in solids and gases Explanation of Raman effect – Application of Raman effect in a molecular spectra \* **Self**

**Study**

**TEXT BOOKS**

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Brijlal and Subramaniam	A Text Book of Optics (Units I , II & III)	S.Chand & Co	23 <sup>rd</sup> Edition 2006
2	Murugesan.R	Modern Physics (Unit IV & V)	S.Chand &Co	17 <sup>th</sup> edition 2013

3	P.K.Chakrabarti	Geometrical and Physical Optics (Unit V)	New Central Book Agency	3 <sup>rd</sup> edition 2005
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#### REFERENCE BOOKS

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	R. Murugesan	Optics and Spectroscopy	S. Chand & Co	8 <sup>th</sup> edition 2012

<b>Semester</b>	:	<b>VI</b>	
<b>Core</b>	:	<b>8</b>	
<b>Title</b>	:	<b>QUANTUM MECHANICS &amp; RELATIVITY</b>	
<b>Subject Code</b>	:	<b>PS13C08</b>	
<b>Credits</b>	:	<b>5</b>	<b>Lecture Hours:71</b>

**Objective:**

To make the students to acquire sufficient knowledge in Properties of matter waves, Wave equation, Schrodinger equation and applications, Operator formalism and Relativity

**UNIT I (14 Hrs)**

**Wave Properties**

Dual nature of matter – De Broglie’s concept of, matter waves- Expression for De-Broglie’s wavelength – Wave packet – Expression for phase velocity and group velocity and relation between them – G.P.Thomson experiment – Heisenberg’s uncertainty principle- physical significance of uncertainty relation – Elementary proof of uncertainty principle -\* Gamma ray microscope – Electron diffraction at a slit \*- Applications – Non-Existence of electrons in the nucleus – Radius of Bohr’s first orbit of H<sub>2</sub> atom and energy in the ground state.

**UNIT II (14 Hrs)**

**Wave Equation**

Wave function for a free particle – Physical interpretation of wave function – derivation of one dimensional time dependent and time independent Schrodinger’s wave equation- Orthogonal and normalized wave functions – Eigen functions, Eigen value and Eigen value equation – Orthogonality of Eigen function – Expectations value – probability current density – Ehrenfest’s theorem – postulates of quantum mechanics

**UNIT III (14 Hrs)**

**Operator Formalism**

Linear operator –commuting and non-commuting operators –operators for momentum, kinetic energy and total energy –Hamiltonian operator-commutation relation between position and momentum and between Hamiltonian and momentum – Hermitian operator and their properties-

Angular momentum operator – commutation relation between  $L_x$ ,  $L_y$ ,  $L_z$  and  $L$  - Ladder operator  $L^+$  and  $L^-$  - Commutation relation between  $L$  and position.

#### UNIT IV

(14 Hrs)

#### Application of Schrodinger equation

Free states – free particle – rectangular potential barrier –  $E < V_0$ - reflection and transmission coefficients-  $\psi$  decay – bound states – particle in an infinitely deep one- dimensional potential well- particle in a rectangular three dimensional box – particle in a one dimensional well of finite depth – linear harmonic oscillator

#### UNIT V

(15 Hrs)

#### Relativity

General theory of relativity-Frames of reference- inertial frames of reference- Galilean transformation equations- Michelson Morley experiment – explanation of negative result – postulates of special theory of relativity- Lorentz transformation equation – Length contraction and time dilation – addition of velocities – variation of mass with velocity – Einstein’s mass energy equivalence- relativity of simultaneity- Minkowski’s space time continuum

#### \* Self Study

#### TEXT BOOKS

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	S.P.Singh, M.K.Bagde and Kamal Singh	Quantum Mechanics	S.Chand & Co.	2 <sup>nd</sup> Edition 1983
2	R.Murugesan	Modern Physics Unit V	S.Chand and Co.,	17 <sup>th</sup> edition 2013
3	Sathya Prakash and Kamal Singh	Quantum Mechanics	Kedarnath & Ramnath Co	New Edition 2002

<b>Semester</b>	:	<b>VI</b>	
<b>Core</b>	:	<b>9</b>	
<b>Title</b>	:	<b>ATOMIC AND NUCLEAR PHYSICS</b>	
<b>Subject Code</b>	:	<b>PS13C09</b>	
<b>Credits</b>	:	<b>5</b>	<b>Lecture Hours:71</b>

**Objective:**

The aim of this paper is to make the students gain knowledge in atomic and nuclear physics.

**UNIT I : Atomic structure: (11 Hrs)**

Rutherford's experiment on scattering of alpha particles-theory of alpha particle scattering-Experimental verification- Bohr model of the atom-spectral series of hydrogen atom-energy level diagram-evidences in favour of Bohr's theory-critical potentials-atomic excitation – Experimental determination of critical potential : Frank and Hertz experiment.

**UNIT II : Vector atom model (17 Hrs)**

Introduction, description, - Spatial quantisation, spinning of electron- Quantum numbers associated with the Vector atom model, \* Coupling Schemes, LS Coupling, JJ Coupling- Applications of Spatial quantisation, Pauli's exclusion principle, Some examples of electronic configuration with their modern symbolic representation - Magnetic moment due to orbital and spin motion – Stern Gerlach Experiment – Optical spectra- Fine structure of sodium D line- Zeeman effect- Experimental arrangement, Expression for Zeeman Shift.

**UNIT III (15 Hrs)**

**Nuclear Models**

Introduction to nucleus - Models of Nuclear structure - Liquid Drop model, Semi empirical mass formula, Shell model, Magic Nos.

**Particle accelerators and detectors**

Linear accelerators, Cyclotron, Betatron, GM counter, Ionisation chamber

**Radioactivity**

Natural radioactivity- properties of alpha, beta and gamma rays, Geiger – Nuttal Law, Gamow's theory of  $\alpha$ - decay,  $\beta$ - ray spectra, magnetic Spectrograph origin of line and continuous spectra, Neutrino theory of  $\beta$  – decay k- electron capture, Gamma ray – introduction, Origin, nuclear isomerism, internal conversion, Mossbauer effect.

**UNIT IV****(15 Hrs)****Artificial Transmutation of Elements**

\*Discovery of Artificial Transmutation – Rutherford’s Experiment \*, Bohr’s theory of nuclear disintegration, Q – value equation- nuclear reactions, energy balance in nuclear reactions.

**Nuclear Transmutation**

Transmutation by (i) Alpha Particles (ii) Protons (iii) Deutrons (V) Neutrons, Scattering cross section, and its determination.

**Artificial radioactivity**

Discovery-preparation of radio elements-applications of radio isotopes.

**UNIT V****(13 Hrs)****Nuclear fission and fusion**

\*Nuclear fission ,\* energy released in fission , Bohr and wheeler theory of nuclear fission , \*chain reaction\* , design of nuclear reactor , Breeder reactor, \*Nuclear fusion , Source of Stellar energy\* ,thermonuclear reactions, transuranic elements.

**Elementary Particles:**

Introduction , classification of elementary particles, four fundamental interactions, Elementary particle quantum numbers , conservation laws & Symmetry ,Quark model.

**TEXT BOOKS**

<b>S. No</b>	<b>Authors</b>	<b>Title of the Book</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Murugesan R	Modern Physics	S.Chand & Co.	17 <sup>th</sup> edition 2013

**REFERENCE BOOKS**

<b>S. No</b>	<b>Authors</b>	<b>Title of the Book</b>	<b>Publishers</b>	<b>Year of Publication</b>
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1	C.L.Arora	Atomic and Molecular Physics	S. Chand & company Ltd	1st edition 2001
2	S.N. Ghoshal	Atomic and Nuclear Physics	S. Chand & company Ltd	1 <sup>st</sup> edition 1994
3	Beiser	Concepts of Modern Physics	Tata McGraw Hill Publishers.	6 <sup>th</sup> edition 1973
4	Ghoshal S.N	Atomic And Nuclear Physics Vol I & Vol II	S.Chand & Co	3 <sup>rd</sup> edition 1994
5	Roy R.R& Nigam	- Nuclear physics	Wiley Eastern Ltd	5 <sup>th</sup> edition 1979

**Elective:**

**Semester** : VI

**Title** : MICROPROCESSOR

**Subject Code** : PS13E04

**Credits** : 5

**Lecture Hours: 86**

**UNIT – I (17 Hrs)**

Microprocessors – Microprocessor instruction set and Computer Languages – Microprocessor Architecture and its operations – \*Memory\* – Input and Output devices – Review: Logic devices for interfacing – 8085 MPU – Memory Interfacing.

**UNIT II (17 Hrs)**

The 8085 Programming Model – Instruction Classification – Instruction and Data format - How to write, Assemble and Execute a simple program – \*Overview of 8085 instruction Set\*- Addressing modes.

**UNIT III (17 Hrs)**

Programming Techniques: Looping , counting and indexing – Additional data transfer and 16 bit Arithmetic instructions – \*Logical Operations\*: Rotate and Compare – Stack and Subroutines- BCD to binary –binary to BCD conversion-binary to ASCII and ASCII to Binary code conversion.

**UNIT IV (17 Hrs)**

8085 interrupts – 8255A Programmable peripheral interface –Block diagram – Mode 0: Simple Input or Output – BSR Mode – Mode1: Input or Output with Handshake – Mode2: Bidirectional Data transfer- Interfacing keyboard and Seven segment display – 8254 programmable interval timer – Block diagram – Programming the 8254 – 8254 as a counter - Modes.

**UNIT V (18 Hrs)**

8259A programmable interrupt controller – Block diagram – Interrupt operations –Priority modes and other features - DMA Controller – \*Basic concepts in serial I/O\* – Software controlled asynchronous serial I/O – 8251A Programmable Communication Interface.

**\* Self Study**



**TEXT BOOKS**

<b>S. No</b>	<b>Authors</b>	<b>Title of the Book</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Ramesh S.Gaonkar	Microprocessor Architecture, Programming and Applications with the 8085	Penram International Publications	4 <sup>th</sup> Edition 2000

**REFERENCE BOOKS**

<b>S. No</b>	<b>Authors</b>	<b>Title of the Book</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Douglas V. Hall	Microprocessors and digital systems	McGraw Hill	1 <sup>st</sup> edition 1983
2	Mohammad Refiguzzaman	Microprocessor and microcomputer based system Design	Universal bookstall	2 <sup>nd</sup> edition 1990

**Elective:**

**Semester** : VI

**Title** : MATERIALS SCIENCE PAPER II

**Subject Code** : PS12E05

**Credits** : 5

**Lecture Hours: 86**

**Objective:**

To make the students learn the Mechanical behavior of Materials, testing methods and different types of materials

**UNIT I**

**Mechanical behavior of Materials**

**(17 Hrs)**

Introduction – different mechanical properties of engineering materials – creep- factors influencing creep resistance – theories of creep- fracture- mechanism of brittle fracture- ductile fracture – mechanism of ductile fracture- difference between brittle and ductile fracture- fatigue fracture- mechanism of fatigue fracture- creep fracture- mechanism of creep fracture – \*factors affecting mechanical properties of materials.\*

**UNIT II**

**Semi conducting materials**

**(17 Hrs)**

Introduction- chemical bond in semi conductors like germanium and silicon- \*Intrinsic and extrinsic semiconductors\*- carrier concentration- carrier concentration in intrinsic semi conductors- carrier concentration in N type semiconductor- carrier concentration in P type semiconductor- variation of carrier concentration with temperature in n type semiconductor- conductivity of extrinsic semiconductors.

**UNIT – III**

**Non destructive testing**

**(17 Hrs)**

Introduction – Radiographic methods – Photo elastic methods- Magnetic methods – Electrical methods – Ultrasonic methods- Visual and other optical methods – Thermal methods –

Surface defect detection – NDT –Equipments used in non destructive testing- metallurgical microscope- \*Electron microscope- Coolidge x ray tube – Production of ultrasonic waves \*– Magnetostriction ultrasonic generator- Piezoelectric ultrasonic generator.

#### UNIT – IV

(17 Hrs)

##### Modern Engineering materials

Introduction- Polymers-ceramics-Super strong materials- Cermets – High temperature materials – Thermoelectric materials – \*Electrets\* – Nuclear engineering materials.

#### UNIT – V

(18Hrs)

##### New materials

Introduction – Metallic glasses – Fiber reinforced plastics – metal matrix composites – optical materials – Materials for optical sources – \*Fibre optic materials\* – Display materials – acoustic materials and their applications-SAW materials-bio materials-high temperature superconductors.

\* Self study

#### TEXTBOOKS

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	M.Arumugam	Materials Science	Anuradha agencies-Kumbakonam	1 <sup>st</sup> edition 1987 Revised 1990

#### REFERENCE BOOKS

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	S.O.Pillai	Solid state Physics	New age International Private Limited	6 <sup>TH</sup> edition 2011
2	Khurmi Sedha	Material Science	S. Chand & Co.	4 <sup>th</sup> edition 2001

**Elective:**

**Semester** : VI

**Title** : **BIOMEDICAL INSTRUMENTATION PAPER II**

**Subject Code** : **PS12E06**

**Credits** : **5** **Lecture Hours: 86**

**Objective:**

To make the students learn the Mechanical behavior of Materials, testing Objective. To enable the students to learn the principles of Diagnostic, therapeutic and other specialized bio medical equipments.

**UNIT I** ( 17 Hrs )

**Basics of Diagnostic radiology**

Nature of X-rays-production of X-ray-stationary anode tube- X-ray machine- Medical ultrasound-basic pulse-echo apparatus-pulse repetition frequency generators-transmitter-receiverbiological effects of ultrasound.

**UNIT II**

**Operation theatre equipment** (17 Hrs)

Surgical diathermy- Shortwave diathermy-Microwave diathermy-Ultrasonic diathermy- Therapeutic effect o heat-Range and area of irritation of different diathermy techniquesVentilators- Anesthesia Machine-Blood flow meters-Cardiac output measurements-Pulmonary function analysers-Gas analysers-\*Blood Gas analysers-Oxymeters\*-Elements of intensive care monitoring

**UNIT III** (17 Hrs)

**Therapeutic equipments**

Medical thermography- physics of thermography-infrared radiation- infrared detectors- thermographic equipment- Physiotherapy equipments: High frequency heat therapy-short wave diatherapydiapulse therapy-microwave diatherapy-ultrasonic therapy

**UNIT IV****(17 Hrs)****Specialised Medical Equipment**

Blood cell counter-Electron Microscope-Radiation detectors-Photo detectors and Colorimetersdigital thermometer-Audiometers-X-ray tube-X-ray machine-Radiography and fluoroscopy-Image intensifiers-Angiography-\*Applications of X-ray examination\*

Bio telemetry- radiotelemetry systems- problems in implant telemetry-uses.

**UNIT V****(18 Hrs)****Computers in Biomedical Instrumentation**

The digital computer-Microprocessors-Interfacing the computer with medical instrumentation and other equipment-Biomedical computer applications \*Self Study

**TEXT BOOKS**

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	M.Arumugam	Biomedical Instrumentation (Unit III)	Anuradha agencies-Kumbakonam	1 <sup>st</sup> edition 2007

**REFERENCE BOOKS**

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	James Cameron	Medical Physics (Units II)	Wiley publications	1 <sup>st</sup> edition 1978
2	Khandpur R.S	Handbook of Biomedical Instrumentation (Unit I)	TMH, Delhi Publications	1 <sup>st</sup> edition 2008
3	Leslie Cromwell, Fred J Weibell and Erich A.Pfeiffer	Biomedical Instrumentation and measurements Unit IV, V	Prentice Hall of India	2 <sup>nd</sup> edition 1992

<b>Semester</b>	: VI
<b>Advance Level Course</b>	: 2
<b>Paper</b>	: 2
<b>Title</b>	: ENERGY PHYSICS PAPER- II
<b>Sub code</b>	: PS12AC3
<b>Credits</b>	: 5

**Objective:**

This paper aims to introduce the different nonconventional energy sources and the methods of harnessing energy from them

**UNIT I**

**Solar Energy**

Solar radiation – Solar radiation outside the earth's atmosphere Solar radiation at the earth's surface – Solar Thermal Energy – Solar Thermal devices and systems:Solar water heater – Sub components of solar water heater – Solar Cooker and its merits and demerits.

**UNIT II**

**Wind Energy**

Power in the wind – Types of wind energy systems –Horizontal axis wind Turbine – Vertical axis wind Turbine.

**UNIT III**

**Ocean Energy**

Tidal Energy – Ocean Thermal Energy Conversion (OTEC) – Closed Cycle OTEC system – Open Cycle OTEC System

**UNIT IV**

**Energy from Biomass**

Biomass feedstock-water material-energy crops-important properties of biomass-conversion of biomass to gaseous fuels-anaerobic digestion-thermal gasification.

**UNIT V**

**Geothermal Energy**

Introduction- Estimates of Geothermal power – Nature of Geothermal fields – Geothermal sources – Advantages and Disadvantages of geothermal energy- Applications of geothermal energy.

**TEXT BOOKS**

<b>S.No</b>	<b>Authors</b>	<b>Title of the Book</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Sukhatme S.P	Solar Energy (Unit I)	Wiley publications	1 <sup>st</sup> edition 1975
2	Rai. G.D	Non Conventi Sources of Energy	Khanna Publishers	1 <sup>st</sup> edition 2009
3	Rai G.D	Solar Energy Utilization (Units II & III)	Khanna Publishers	1 <sup>st</sup> edition 1987
4	Yogi.D Goswami, Frank Krieth and Jan F. Krelder	Principles of Solar Engineering (Units IV & V)	Tailor & Francis	1 <sup>st</sup> edition 2003

<b>Semester</b>	<b>:</b>	<b>VI</b>
<b>Advance Level Course</b>	<b>:</b>	<b>2</b>
<b>Paper</b>	<b>:</b>	<b>2</b>
<b>Title</b>	<b>:</b>	<b>EXPERIMENTAL TECHNIQUES &amp; DATA ANALYSIS -PAPER- II</b>
<b>Sub code</b>	<b>:</b>	<b>PS12AC4</b>
<b>Credits</b>	<b>:</b>	<b>5</b>

### **Objective:**

To make the students understand the concepts of data acquisition systems, data conversion, the principles of working of input and output devices, displays, amplifiers, Electronic measuring and testing instruments.

### **UNIT – I**

#### **Data Acquisition and Conversion**

Introduction – Signal conditioning of the inputs – Single channel data acquisition systems – Multi channel data acquisition system – Data conversion – Digital of Analog converter – Analog to Digital converter – Multiplexer and Sampling hold circuits.

### **UNIT II**

#### **Input – Output Devices and Displays**

Introduction – Analog display and recorder – Graphic recorder – Optical oscillograph – self balancing potentiometer – X-Y recorder – Magnetic recorder – Digital input – output devices – Punched card-paper type – output equipments – Line printer – Digital tape recording – Disk files and floppy disk.

### **UNIT III**

#### **Electronic Measuring Instruments:**

Q-meter- Vector impedance meter- Digital frequency meter – Digital voltmeter – Phase meter- RF power and voltage measurement –Power factor meter – Vector voltmeter.

### **UNIT –IV**

#### **Amplifiers:**



Instrumentation amplifiers,- isolation amplifiers-chopper amplifiers – voltage to frequency and frequency to voltage converters – frequency multipliers – logarithmic amplifiers.

## UNIT –V

### General purpose electronic Test Equipment:

Oscilloscope : Basic principles – CRT features – Basic principles of signal displays – Block diagram of oscilloscope – Simple CRO – Vertical amplifier – Horizontal deflecting system –Delay line in triggered sweep – CRT connection – Dual beam CRO – Dual beam oscilloscope –Storage oscilloscope measurement of frequency, capacitance, inductance and Voltage wave analysers and Spectrum analysers.

### TEXTBOOKS

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Hefnick .A.O and W.D. Cooper	Modern Electronic Instrumentation and Measurement Techniques (Unit III)	Prentice Hall India Publications	1 <sup>st</sup> edition 1978
2	C.S. Rangan, G.R. Sharma and VSV Mani	Instrumentation Devices and Systems (Unit I,II,IV, V)	Tata McGraw Hill Publications	2 <sup>nd</sup> edition 1983

<b>Semester</b>	:	<b>VI</b>
<b>Practical Lab</b>	:	<b>4</b>
<b>Title</b>	:	<b>CORE PRACTICALS IV</b>
<b>Sub Code</b>	:	<b>PS10CP4</b>
<b>Credits</b>	:	<b>4</b>

**Practical Hours: 90**

### **Objectives:**

To make the students acquire practical knowledge in making use of the 8085 ALP for mathematical and logical operations and to develop program writing skills using the C language.

### **List of Experiments**

1. 8085 ALP for 8 bit addition using Memory and register
2. 8085 ALP for 8 bit subtraction using Memory and register
3. 8085 ALP for 8 bit multiplication and division
4. 8085 ALP using control instructions (Increment/Decrement & Rotate)
5. 8085 ALP for finding the biggest and smallest element in the array
6. 8085 ALP to sort the array in ascending and descending order
7. 8085 ALP for BCD to Binary conversion
8. 8085 ALP for Binary to BCD conversion
9. 8085 ALP for Binary to ASCII conversion 10. 8085 ALP for ASCII to Binary conversion.
11. Write a Program that the inputs three integers from the key board and prints SUM, AVERAGE, PRODUCT, SMALLEST and LARGEST of THREE NUMBERS
12. Write a program to arrange a set of numbers in ascending order using SELECTION SORT
13. A palindrome is a string that is spelled the same way forwards and backwards. An example is "RADAR". Write a Recursive function to test palindrome and the function return TRUE if the given string is palindrome and FALSE otherwise. The function should ignore spaces and punctuation in the string.
14. Write a program to perform transpose of a given matrix

15. Write a program to perform Matrix Addition
16. Write a program to perform Matrix Multiplication
17. Write a program to find the number of days elapsed between two dates
18. Write a program to convert integer in the range 1 to 100 into words
19. Write a program that uses functions to compare two strings input by the user .The program should state whether the first string is less than, equal or greater than the second string
20. Write a program to find the solution of the given quadratic equation.

<b>Semester</b>	<b>:</b>	<b>I &amp; II</b>	
<b>Career Oriented Programme</b>	<b>:</b>	<b>Embedded System Design</b>	
<b>Paper</b>	<b>:</b>	<b>1</b>	
<b>Title</b>	<b>:</b>	<b>CIRCUIT SIMULATION, PRINTED CIRCUIT BOARD DESIGN AND FABRICATION</b>	
<b>Sub code</b>	<b>:</b>	<b>ADS1201</b>	
<b>Credits</b>	<b>:</b>	<b>4</b>	<b>Total Hrs: 60</b>

**Objective:**

To understand the principles and design characteristics of digital and analog devices to study them by simulation; to learn the design tools, fabrication and assembly testing techniques of PCB.

**UNIT I- Digital Simulation**

Basic Logic Gates - Boolean Algebra – Arithmetic Operations and Circuits - code converters, Multiplexers and Demultiplexers - Logic Families and their Characteristics - Flip-Flops and Registers - Counter Circuits - Shift Registers - Multivibrators and the 555 Timer .

**UNIT II- Analog Simulation**

Junction Diodes - Common Diode Applications - Basic Power Supply Circuits, Clippers, Bipolar Junction Transistors - DC Biasing Circuits(elementary ideas only) - Introduction to Amplifiers - Common Emitter Amplifiers - Amplifier Frequency Response- Power Amplifiers(only qualitative treatment) – Field Effect Transistors – MOSFET’s - Operational Amplifiers – Op Amp Applications .

**UNIT III- Layout Planning and Design**

General PCB design consideration-electrical design consideration (conductor dimension, resistance, capacitance, and inductance)-component placement rules- **Layout Design:** grid systemlayout scale-layout sketch-layout consideration-materials and aids-land requirements.

**UNIT IV- PCB Fabrication**

General design guidelines for art work preparation: conductor orientation-routing-spacing-hole diameter - solder pad diameter- square pad-no conductor zone-pad centre holes-conductor and solder pad joints

Computer aided design: Basic CAD operation-layout procedure-library manager-component placement-computer aided manufacturing (CAM)-data transfer mechanism.

### UNIT V- Assembly and Testing Of PCB

Anatomy of laminates- etching techniques: etching solutions-etching arrangements-etching parameters-equipments and techniques-testing for quality control- quality control methods-testing of PCB.

#### TEXT BOOKS

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	D.Malvino & A.Leach	Digital Principles and Applications Unit I	TMH Publications	6 <sup>th</sup> edition 2008
2	VK Mehta	Principles of Electronics	S Chand & Co	11 <sup>th</sup> edition 2012
3	B.L. Theraja	Basic Electronics –solid state physics	S Chand & Co	4 <sup>th</sup> edition 2001
4	R.S Khandpur	Printed Circuit Boards Design, fabrication, assembly and testing	Tata McGraw-Hill Publishing Company, New Delhi.	2 <sup>nd</sup> edition 2008

#### REFERENCE BOOKS

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Bosshart Walter.C	Printed Circuit Boards	Tata McGraw Hill Publishing Co Ltd - New Delhi	1 <sup>st</sup> edition 2000
2	Thomas L. Floyd	Digital Fundamentals	Prentice-Hall International, Inc., Upper Saddle River, New Jersey	2 <sup>nd</sup> edition 1997

3	William Kleitz	Digital Electronics, (A Practical Approach)	Prentice-Hall Upper Saddle River, New Jersey	2 <sup>nd</sup> edition 1996
4	Robert T. Paynter	Introductory Electronic Devices And Circuits	Prentice Hall Upper Saddle River, New Jersey, Columbus, Ohio	1 <sup>st</sup> edition 1997
5	Stanley G Burns, Paul R. Bond	Bond Principles Of Electronic Circuits	Iowa State University. PWS Publishing Company Boston	1 <sup>st</sup> edition 1997
6	Muhammad H. Rashid	Microelectronic Circuits	PWS Publishing Company Boston	1 <sup>st</sup> edition 1999
7	Belove, C.,	Handbook of Modern Electronics and Electrical Engineering.	Editor In Chief, 1986	1 <sup>st</sup> edition 1996

<b>Semester</b>	:	<b>I</b>	
<b>Allied</b>	:	<b>1</b>	
<b>Title</b>	:	<b>ALLIED PHYSICS PAPER- I (For B.Sc Chemistry)</b>	
<b>Subject Code</b>	:	<b>PS12A01</b>	
<b>Credits</b>	:	<b>4</b>	<b>Lecture Hours:56</b>

**Objective:**

This paper introduces the students to the basic concepts of Elasticity, Rotational motion, Heat and thermodynamics, Sound, Optics, Atomic and Nuclear Physics

**UNIT – I (11 Hrs)**  
**Properties of Matter**

**Elasticity:** Elastic **moduli**- bending moment-expression – Young’s modulus by uniform and nonuniform bending-theory and experiment- I–section girders\*-Torsion pendulum-couple per unit twist-work done in twisting –determination of the rigidity modulus of the material of the wire.

**UNIT - II (11 Hrs)**  
**Transmission Of Heat**

**Conduction process:** Thermal conductivity- Rectilinear field along a bar- Measurement of Thermal conductivity of a bad conductor by Lee’s disc method

**Convection process:** Lapse rate-stability of atmosphere- Green house effect

**Radiation process:** Solar constant- Pyroheliometer- solar energy and its applications (flat plate collector & solar cooker)\*

**UNIT - III (11 Hrs)**  
**Thermodynamics, Sound:**

**Thermodynamics:** Second law of thermodynamics-explanation-Carnot’s theorem-entropy- change of entropy in reversible and irreversible processes-change of entropy of a perfect gas

**Ultrasonics:** Production by piezo electric method-detection-Applications\*

**UNIT - IV (11 Hrs)**  
**Optics:**

**Dispersion:** Dispersive power-combination of prisms to produce (i) deviation without dispersion (ii) dispersion without deviation\*-direct vision spectroscope.

**Interference:** Air wedge-determination of diameter of a wire-Newton's rings-determination of refractive of a liquid

**Polarisation:** Production, detection and analysis of plane, circularly, elliptically polarized lightquarter and half wave plates

**UNIT - V**

**(12Hrs)**

**Atomic Physics:** Vector atom model -electron, spin quantum numbers-Pauli's exclusion principleexcitation and ionization potential-experimental determination-Franck and Hertz method

**Nuclear Physics:** Mass defect-binding energy- Liquid drop model - Radioactivity-nature of  $\alpha$ ,  $\beta$  &  $\gamma$ ,rays\*-Nuclear Fission – Energy released in a fission- atom bomb-Nuclear fusion- thermonuclear reaction.

**\* Self study**

**Text Books**

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Brijlal Subramaniam	Heat and thermodynamics Unit II	S.Chand and Co	16 <sup>th</sup> Edition 2012
2	Brijlal Subramaniam & Hemne.P.S	Heat thermodynamics and Statistical Physics	S.Chand and Co	12 <sup>th</sup> edition 2011
3	Brijlal Subramaniam	Optics	S.Chand and Co	21 <sup>st</sup> Edition 2012
4	Murugesan R	Allied Physics (Unit I, III & V)	S.Chand and Co	1 <sup>st</sup> Edition 1998



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<b>S. No</b>	<b>Authors</b>	<b>Title of Book</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Jayaprakash. N	Ancillary Physics Volume I	J.P.Publications	1 <sup>st</sup> edition 1994
2	Mathur D.S	Properties matter of	S.Chand and Co	2 <sup>nd</sup> Edition 1970
3	Murugesan R	Modern Physics	S.Chand and Co	9 <sup>th</sup> edition 2013

**Allied:**

<b>Semester</b>	<b>:</b>	<b>II</b>	
<b>Title</b>	<b>:</b>	<b>ALLIED PHYSICS PAPER- II (For B.Sc Chemistry)</b>	
<b>Subject Code</b>	<b>:</b>	<b>PS12A02</b>	
<b>Credits</b>	<b>:</b>	<b>4</b>	<b>Lecture Hours:71</b>

**Objective:**

This paper introduces the students to the basic concepts of Wave Mechanics, Optics, Atomic, Nuclear Physics, and Electronic

**UNIT - I (14Hrs)**  
**Static Electricity:**

Gauss theorem and its proof-applications-field due to uniformly charged sphere –intensity due to a plane sheet of charge-\*Coulomb’s theorem-Principle of a capacitor\*-capacity of a parallel plate and spherical capacitor-energy stored in a capacitor-loss energy due to sharing of charges

**UNIT - II (14Hrs)**  
**Current Electricity and electromagnetism:**

Kirchoff’s laws-explanation- Wheatstone’s network-Potentiometer\*-calibration of voltmeter-calibration of ammeter-comparison of resistances-Biot-Savart’s law –force on a conductor carrying current in a magnetic field-Ballistic galvanometer- correction for damping measurement of capacity of a condenser using B.G.

**UNIT – III (14Hrs)**  
**Alternating currents:**

Mean and RMS values of AC\* -Series and parallel resonant circuits-Power factor- power factor of an ac circuit containing resistance, inductance and capacitance -Transformer-constructionworking-losses.

**UNIT – IV (14Hrs)**  
**Electronic devices, circuitry and communication:**

Zener diode- V-I characteristics-its application in voltage regulation-Transistors-working characteristic (CE, CB,CC mode)-Biasing-potential divider method-Single stage amplifier(CE)-frequency response-feedback principle-**Barkhausen** criterion for sustained oscillations-Hartley oscillator

**UNIT – V****(15Hrs)****Digital Electronics:**

Boolean algebra\*-DeMorgan's theorems-OR, AND, NOT, XOR NOR and NAND gates NOR and NAND gates as universal building blocks-half adder, full adder-RS flip flop-JK flip flop Operational amplifier: Characteristics-virtual ground-summing point-inverting and non inverting amplifier-adder-subtractor

**\* Self study****Text Books**

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Brijlal Subramaniam	Heat and thermodynamics Unit II	S.Chand and Co	16 <sup>th</sup> Edition 2012
2	Brijlal Subramaniam & Hemne.P.S	Heat thermodynamics and Statistical Physics	S.Chand and Co	12 <sup>th</sup> edition 2011
3	Brijlal Subramaniam	Optics	S.Chand and Co	21 <sup>st</sup> Edition 2012
4	Murugesan R	Allied Physics (Unit I, III & V)	S.Chand and Co	1 <sup>st</sup> Edition 1998

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3	Murugesan R	Modern Physics	S.Chand and Co	9 <sup>th</sup> edition 2013

<b>Semester</b>	:	<b>III</b>	
<b>Allied</b>	:	<b>1</b>	
<b>Title</b>	:	<b>ALLIED PHYSICS PAPER- I (For B.Sc Mathematics)</b>	
<b>Subject Code</b>	:	<b>PS12A03</b>	
<b>Credits</b>	:	<b>4</b>	<b>Lecture Hours:56</b>

**Objective:**

This paper introduces the student to the basic concepts of Elasticity, Rotational motion, Heat and thermodynamics, Sound, Optics, Atomic and Nuclear Physics

**UNIT – I** **(11Hrs)**  
**Properties Of Matter**

Elasticity: Elastic **moduli**- \*bending moment\*-expression – Young’s modulus by uniform and non-uniform bending-theory and experiment- Torsion pendulum-couple per unit twist-work done in twisting –determination of the rigidity modulus of the material of the wire.

**UNIT - II** **(11 Hrs)**  
**Transmission Of Heat**

**Conduction process:** Thermal conductivity- Rectilinear field along a bar- Measurement of Thermal conductivity of a bad conductor by Lee’s disc method

**Convection process:** Lapse rate-stability of atmosphere- Green house effect

**Radiation process:** Solar constant- Pyroheliometer- solar energy and its \*applications (flat plate collector & solar cooker)\*

**UNIT - III** **(11Hrs)**  
**Thermodynamics, Sound:**

Thermodynamics: Second law of thermodynamics-explanation-Carnot’s theorem-entropy-change of entropy in reversible and irreversible processes-change of entropy of a perfect gas

**Ultrasonics:** Production by piezo electric method-detection-\*Applications\*

**UNIT - IV** **(11Hrs)**  
**Optics:**

**Dispersion:** Dispersive power-combination of prisms to produce (i) deviation without dispersion (ii) dispersion without deviation\*-direct vision spectroscope.

**Interference:** Air wedge-determination of diameter of a wire-Newton's rings-determination of refractive of a liquid

**Polarisation:** Production, detection and analysis of plane, circularly, elliptically polarized lightquarter and half wave plates

**UNIT - V**

**(12Hrs)**

**Atomic Physics:**

Vector atom model -electron, spin quantum numbers-Pauli's exclusion principle-excitation and ionization potential-experimental determination-Franck and Hertz method

**Nuclear Physics:** Mass defect-binding energy- Liquid drop model - Radioactivity-nature of  $\alpha$ ,  $\beta$  &  $\gamma$ ,rays\*-Nuclear Fission – atom bomb-Nuclear fusion- thermonuclear reaction. \* **Self study**

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3	Murugesan R	Modern Physics	S.Chand and Co	9 <sup>th</sup> edition 2013

**Allied:**

<b>Semester</b>	<b>:</b>	<b>IV</b>	
<b>Title</b>	<b>:</b>	<b>ALLIED PHYSICS PAPER- II (For B.Sc Mathematics)</b>	
<b>Subject Code</b>	<b>:</b>	<b>PS12A04</b>	
<b>Credits</b>	<b>:</b>	<b>4</b>	<b>Lecture Hours:56</b>

**Objective:**

This paper introduces the student to the basic concepts of Wave Mechanics, Optics, Atomic, Nuclear Physics, and Electronic

**UNIT - I (11Hrs)**

**Static Electricity:**

Gauss theorem and its proof- field due to uniformly charged sphere –intensity due to a plane sheet of charge-\*Coulomb’s theorem-Principle of a capacitor\*-capacity of a parallel plate and spherical capacitor-energy stored in a capacitor-loss energy due to sharing of charges

**UNIT - II (11Hrs)**

**Current Electricity and electromagnetism:**

Kirchoff’s laws-explanation- Wheatstone’s network-Potentiometer\*-calibration of voltmeter-calibration of ammeter-comparison of resistances-Biot-Savart’s law –force on a conductor carrying current in a magnetic field-Ballistic galvanometer- correction for damping measurement of capacity of a condenser using B.G.

**UNIT – III (11Hrs)**

**Alternating currents:**

Mean and RMS values of AC -Series and parallel resonant circuits-Power factor- power factor of an ac circuit containing resistance, inductance and capacitance -\*Transformer construction-working-losses\*.

**UNIT – IV (11Hrs)**

**Electronic devices, circuitry and communication:**

Zener diode- V-I characteristics-its application in voltage regulation-Transistors-working characteristic (CE, CB, CC mode)-Biasing-potential divider method-Single stage amplifier (CE)-frequency response-feedback principle-Barkhausen criterion for sustained oscillations-Hartley oscillator

**UNIT – V****(12Hrs)****Digital Electronics:**

Boolean algebra\*-DeMorgan's theorem-OR, AND, NOT, XOR NOR and NAND gates-NOR and NAND gates as universal building blocks-half adder, full adder-RS flip flop-JK flip flop

Operational amplifier: Characteristics-virtual ground-summing point-inverting and non inverting amplifier-adder-subtractor \* **Self study**

**Text Books**

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3	Murugesan R	Modern Physics	S.Chand and Co	9 <sup>th</sup> edition 2013



<b>Semester</b>	: III & IV / I & II
<b>Practical Lab</b>	: 1& II
<b>Title</b>	: ALLIED PHYSICS PRACTICALS
<b>Sub Code</b>	: PS08AP1
<b>Credits</b>	: 2

**Practical Hours: 72**

**Objective:**

To enable the student to gain practical knowledge

**List of Experiments**

1. Young's Modulus –Non- Uniform bending –Pin and Microscope
2. Young's Modulus – Uniform bending – Optic lever
3. Rigidity modulus - Static torsion
4. Rigidity Modulus - torsional pendulum
5. Moment of inertia - torsional pendulum
6. Acceleration due to gravity - compound pendulum
7. Thermal conductivity of a bad conductor – Lee's disc method
8. AC frequency - Sonometer
9. Refractive index of solid prism - spectrometer
10. Refractive index of liquid-Hollow prism - spectrometer
11. Wave length- Grating - Minimum deviation method - Spectrometer
12. Low range Ammeter Calibration - Potentiometer
13. Low range Voltmeter Calibration - Potentiometer
14. Moment of a magnet in the Tan C position
15. Volt-Ampere characteristic of a p-n junction diode in the forward and reverse directions
16. Characteristics of Transistor CE Circuit
17. Logic gates - Verification of the truth table

18. Characteristics of Zener diode

19. Closed loop gain of Operational Amplifier in Inverting mode Closed loop gain of Operational Amplifier in Non Inverting mode.