P. Menaka.
Assistant Professor/Physics
T.J. College of Arts & Science
Pudukkottai.

Paper Name:

1. Basic Electronics – UHRIPHCC7
2. Applied Physics – UHRIAPHAC3

day / hour	1	2	3	4	D
D_1	II. B.Sc 'B' (CS)				
D_2		II. B.Sc CS 'A'	II. B.Sc Phy		
D_3	I. B.Sc CS 'A'				II. B.Sc CS 'A'
D_4	II. B.Sc Phys.		II. B.Sc CS 'A'	III. B.Sc CS 'A'	
D_5		II. B.Sc CS 'A'		I. B.Sc Maths, Phy	
D_6	I. B.Sc Maths, Phy	II. B.Sc CS 'A'		II. B.Sc CS 'A'	

Subject: Basic Electronics

Subject code: U4RIPHCC7

Unit -I : Semiconductors and Diodes

Intrinsic and Extrinsic Semiconductor - PN junction diode - Biasing of PN junction - VI characteristics of diode - Rectifiers - Half wave - full wave and Bridge rectifiers - Break down mechanisms - Zener diode - characteristics - Zener diode as voltage regulator.

Unit -II : Transistors (BJT & FET)

BJT Structure - Working of a transistor - Three configuration of transistors (CB, CE and CC) CE amplifier circuit - Dc load line - JFET - Structure - Characteristic - parameters - Comparision between FET and BJT.

Unit -III : Amplifiers And Oscilators.

Transistor as a two port network - h parameters Single stage CE amplifier - Analysis of hybrid equivalent circuit - Power amplifiers - Efficiency of class B Power and push pull amplifier - General theory of feedback - properties of negative feedback Criterion for oscillations - Hartly Oscillator - Colpit's oscillator - Wien bridge's Oscillator.

type of carries either electrons or holes.

↓

high i/p impedance

↓

voltage deriven device

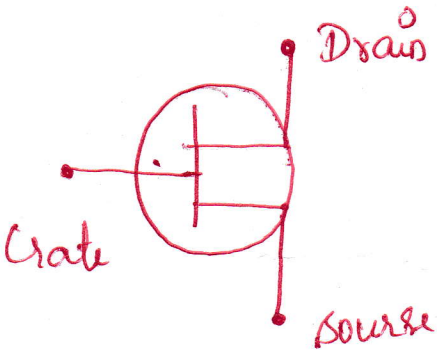
↓

low noise level.

↓

Transconduction

↓



and holes.

↓

low input impedance.

↓

current drive device.

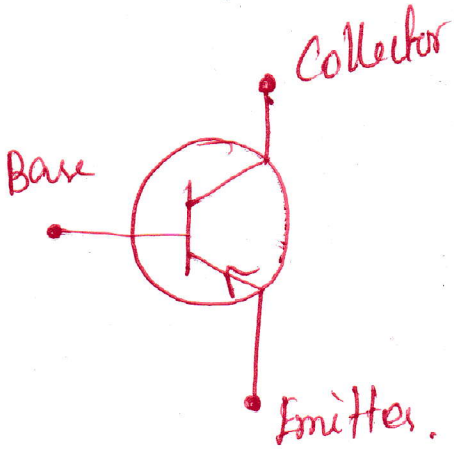
↓

high noise level.

↓

voltage gain

↓



10/10/22

Dr. M.K. MURALI, M.Sc.,M.Phil.,Ph.D
HEAD AND ASSISTANT PROFESSOR,
P.G. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous)

Dr.J.PARASURAMAN, M.A.,M.B.A.,M.C.A
M.Phil.,B.Ed.,Ph.D
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)

Dr. M. Bhuvaneswari
Dept. of Physics
T. T. College of Arts & Science
Pudukkottai

Day / Hr	I	II	III	IV	V
D1		I PG		III UG A'	
D2	←	III UG 'A'	→	III UG A	
D3	←	II CS B	→		III UG A
D4		I PG	←	III UG A'	→
D5	I PG		I PG		III UG 'A
D6	I PG			III UG.	

Semester – II Core Course – VII Statistical Mechanics

Course code: P2R1PHCC7

Unit: 1 Thermodynamics

Laws of thermodynamics – Entropy – calculation of entropy – changes in reversible processes – The principle of increase of entropy – Thermodynamic Potentials – Enthalpy Helmholtz and the Gibb's functions – phase transitions – the Clausius Clayperon equation – Vander waals equation of state

Unit: 2 Kinetic theory

Distribution function and its evolution – Boltzmann transport equation and its validity – Boltzmann's H-theorem – Maxwell relation – chemical potential – Transport phenomena – Mean free path – Conservation laws.

Unit: 3 classical statistical physics:

Review of probability theory – Macro and micro States – statistical equilibrium – phase space and ensembles – Density function – Liouville's theorem – Maxwell – Boltzmann distribution laws – Micro canonical ensemble – ideal gas – Entropy – partition function – principle of equipartition of energy – Canonical and grand canonical ensembles.

Unit: 4 Quantum Statistical Mechanics:

Basic concepts – Quantum ideal gas – Bose Einstein and Fermidirac statistics – Distribution laws – Sackur and tetrode eqn – Equation of state – Bose Einstein condensation – Random walk and Brownian motion – Diffusion equation.

Unit: 5 Applications of QSM:

Ideal Bose gas: Principle of detailed balance – photons – Black body and planck radiation – Specific heat of solids – Liquid Helium.

Ideal Fermi gas: Properties – Degeneracy – Electron gas – Pauli paramagnetism.

Ferromagnetism: Ising and Heisenberg models.

Books for Study:

1. Statistical Mechanics, (K. Huang, Wiley Eastern Ltd. New Delhi 1963)
2. Statistical Mechanics, B.K Agarwal and M. Eisner (Wiley Eastern Ltd, New Delhi 1994
3. Thermodynamics, N. Sears and L. Salinger (Narosa, New Delhi 1989)

* Average energy associated with each degree of freedom;

$$\bar{E} = \frac{h\nu}{e^{h\nu/kT} - 1}$$

By planck's theory.

× —— ×

10/10/22

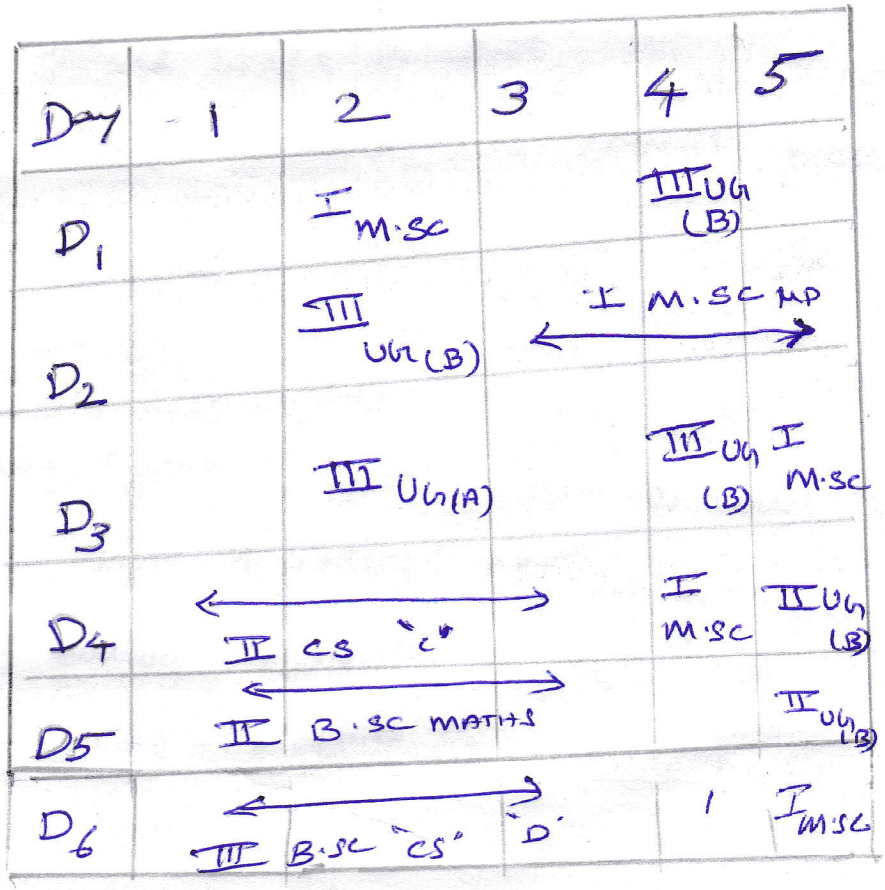
Dr. M.K. MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

Dr.J.PARASURAMAN, M.A.,M.B.A.,M.C.A.
M.Phil.,B.Ed.,Ph.D
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422

S. DHANACHAYAN.

III B.Sc Physics

PHYSICS FOR HOME APPLIANCE



I. I M.Sc PHYSICS - Microprocessor

II. III UG B.Sc PHYSICS → PHYSICS FOR HOME APPLIANCE

III. III UG (A) B.Sc PHYSICS → MATERIAL Science.

Electrical Home Appliances

Code : U6R1PHSBE3.

unit - I :

Safety precaution.

Electricity - Basic principles - practical unit of electricity - international System (S.I) of units - electric Shock - precaution to avoid electric Shock - Reduce steps in electric Shock - methods of resuscitation - electric line circuit breaker (ELCB).

unit - II :

Wiring

Wiring System - electric supply to house and factories - types of wiring - ISI rules - meggar testing - earthing - electricity in house - Design for heating element - electric iron, Table heater, Hot plate and Room heater.

unit - III :

Electrical Measuring Instruments.

Moving coil instruments - Voltmeter - Ammeter - wattmeter - Kilowatt meter - Frequency meter - Multi meter.

prevent electronic noise or voltage surges on the input from reaching the load, power factor correction and storing energy so it can continue to power the load in the event of a temporary interruption in the source power.

*All power supplies have a power input connection, which receives energy in the form of electric current from a source, and one or more power output or rail connections that deliver current to the load.

*The input and output are usually hardwired circuit connections. Though some power supplies employ wireless energy transfer to power their loads without wired connections. Some power supplies have other types of inputs and outputs as well, for functions such as external monitoring and control.

10/10/22

Dr. M. [illegible] M.Sc.,M.Phil.,Ph.D
HEAD & ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous) PUDUKKOTTAI

Dr.J.PARASURAMAN, M.A.,M.B.A.,M.C.A.,
M.Phil.,B.Ed.,Ph.D
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422.

Dr. K. Dhanabalan
Assistant Professor/Physics.

Paper title.

1. Electromagnetic theory – P2RIPHCC5
2. C-Language – U6RIPHMBE2

	1	2	3	4	5
D1	I-PG				I-PG
D2	I-PG		III-UG (B)		
D3			III-UG (B)	Lab III-A	
D4			III-UG (B)	Lab III-C (B)	
D5		I-PG			
D6			III-UG (B)	I-PG	

paper: Electromagnetic theory

Sub code: P2RIPHCC5

Unit-I: Electrostatics

Coulombs law - electric intensity - electric potential - gauss law - dielectrics and it's polarization - dielectric Constant - types of polarisibility - polarisation of polar and non polar molecules :- Clausius mosottic equation - langevin equations.

Unit-II: Boundary value problems in electrostatics

Boundary conditions - poissons and laplace equations - method of separation of variables in cartesian coordinates (potential at a point between the parallel plate capacitor and two grounded plane electrode) - method of images (point charge near and infinity ground - cylindrical coordinates (In a uniform field Conducting cylinder and dielectric cylinder) - method of images (point charge near and infinity ground Conducting plane point charge near Conducting sphere) - green function method.

Unit-III: Magnetostatics

$$\int_{\text{all space}} \frac{1}{2}(E\cdot D + H\cdot B)\,d\tau$$

with the energy of the electromagnetic field

$$(or)\quad U = \int_{\text{all space}} \frac{1}{2}(E\cdot D + H\cdot B)\,d\tau. \quad \text{---(12)}$$

12/05/22 Thursday

quantity U - as a potential energy.

C. Interpretation of $\oint_S (E\times H)\,ds$:-

* Instead of taking the volume integral in eqn (7) over all space, let us now consider a finite volume
* Here $(E\times H) \neq 0$
* The conservation of energy

$$\frac{\partial U}{\partial t} + \frac{\partial W}{\partial t} = -\oint_S (E\times H)\cdot ds \quad \text{---(13)}$$

* The L.H.S is the time rate of change of the energy of the field and the particles contained within the volume τ.
* Consider $\oint_S (E\times H)\cdot ds$ energy flow of the surface
* The vector $(E\times H)$ is called poynting vector and is represented by S.

$$(or)\quad S = (E\times H) \quad \text{---(13)}$$

Interpretation of the Energy Equation:-

* In the light of above, [illegible] of differential form

16/10/22

Dr. M.K. [illegible] M.Sc., M.Phil., Ph.D.
HEAD AND ASSISTANT PROFESSOR
DEPARTMENT OF PHYSICS

Dr. J. PARASURAMAN M.A., M.B.A., M.C.A., M.Phil., B.Ed., Ph.D.
PRINCIPAL
Arts and Science

Dr. S. GEETHA
Assistant Professor
Department of Physics.

Day / Order Hr	1	2	3	4	5
D1		III UG A'		II B.Sc Physics	
D2				II yr SBE	
D3	II B.Sc CS			II yr SBE	
D4		III UG A'		II yr SBE	
D5	III UG A'		III UG A'		II yr SBE
D6			III UG A'		

II Chemistry

SEM – V. MAJOR BASED EELCTIVE COURSE – II COMPUTERPROGRAMMING– C LANGUAGE - Employability		
Course Code : U6R1PHMBE2		**Max. Marks : 100**
Hours/Week : 4		**Internal Marks : 25**
Credit : 4		**External Marks : 75**

OBJECTIVES:

- To understand the basic concepts of C programming.
- To write some simple programs and some basic idea about flow-charting and algorithms.
- To understand the concepts of Arrays and Functions
- To develop skills in pointer and Structures
- To able to write different programmes using codes.

UNIT -I: INTRODUCTION TO C **9 Hrs**

Introduction: Importance of C–Basic structure of C Programs–Programming Style–Character set, Keywords and Identifiers–Constants–Data Types –Variables– Declarations of Variables– Assigning Values of variables.

Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement,Conditional,Bitwise,CommaOperators–Arithmeticexpressions–Procedure and Associativity.

UNIT -II: CONTROL STRUCTURES **9 Hrs**

Input Output Operator: get char, put char, Formatted output(printf) and Formatted input (scanf). Control Structure: Decision making and branching statements (if, if-else, nested if, else if ladder, switch, go to, break and continue) – Decision making and looping statements (while, do- while, for).

UNIT - III: ARRAYS AND FUNCTIONS **9 Hrs**

Arrays: One – dimensional and two dimensional arrays, declaring arrays– initializing arrays.

Functions: Basic functions – Return values and their types – calling a function – external variables and scoperules – Recursion.

UNIT - IV: STRUCTURESAND POINTERS **10 Hrs**

Structures: Definition and initialization–ArraysofStructures–Arrayswithinstructures–Structures and functions – Unions.

Pointers: Introduction to pointers – declaring pointer variables - initialization of pointer variables – Files- definition, opening and closing of files- input/out put operation on files.

UNIT –V: **9 Hrs**

Development of algorithm, flow chart and program for the following problems.

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.
3. Solvingquadraticequation.
4. Findingthefactorial usingrecursion.
5. Addition and subtraction of two matrices.
6. Findingthesmallest and largest element in anarray.
7. Sortingaset of numbers in ascending/ descendingorder.

13/5/22 D5/5

Colour centres:

Pure ionic crystals like NaCl, KCl etc are transparent when visible light is passed through them. However, these crystals may be made to appear coloured by any one of the following ways.

i) Adding impurities
ii) " metal ions
iii) Electrolysis.

20/10/22

Dr. M.K. MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous) ★ PUDUKKOTTAI ★

Dr.J.PARASURAMAN, M.A.,M.B.A.,M.A.,
M.Phil.,B.Ed.,Ph.D
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422

P. Parameswari
Assistant professor
Department of physics.
J.J. college of Arts and Science, Pudukkottai.

Academic year : Feb 2022 – May 2022

[U6RIPHCC13]

1. Elements of Theoretical physics – III Bsc physics
2. [U4RIPHAC6] – Allied physics III Bsc chemistry

	1	2	3	4	5
D_1	← II CS 'A' lab →			Allied	
D_2		Allied			III UG 'B'
D_3			Allied	III UG 'B'	
D_4	← III Bsc lab →			III UG 'B'	
D_5		III UG 'B'	Allied		Allied
D_6		III UG 'B'	← II Bsc chemistry lab →		

Allied physics II

[U4R1PHAC6]

Unit - I Electrostatics

Coulomb's law - Gauss Theorem and it's application - Intensity due to charged sphere and cylinder. Capacitors - principle of a capacitor - Capacity of a capacitor - Capacity of an isolated sphere and cylinder - Energy of a charged capacitor - sharing of charges and loss of energy.

Unit - II Electricity

Kirchoff's Law and their applications to wheatstone's network - Condition for bridge balance - Carey foster's bridge - Variation of

are allowed to fall on a scattering material like a small block of Carbon.

⇒ The scattered x-rays are received by Bragg's spectrometer and their wavelength is determined.

⇒ The wavelength of the scattered x-rays is measured for different values of the scattering angles.

16/6/22

Dr. M.K. MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU).
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous) ★ PUDUKKOTTAI ★

Dr.J.PARASURAMAN, M.A., M.B.A., M.C.A., M.Phil., B.Ed., Ph.D
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422

2021-2022

Mr. S. SASIKUMAR
Assistant professor
Department of physics
J.J. college of Arts & science
Pudukkottai - 622422

Date
21/03/2022

Time Table :-

Day / Hour	I	II	III	IV	V
D1	—	—	III Vac 'B'	II CS 'C'	—
D2	← III CS 'C' →		II CS 'C'	—	—
D3	II CS 'C'	—	III Vac 'B'	—	—
D4	I M.Sc	—	I M.Sc	II CS 'C'	—
D5	← II CS 'C' →			I M.Sc	—
D6	—	II CS 'C'	I M.Sc	← III Vac 'B' 'C' →	

Electrical Home Appliances:-

Unit - I : Safety precaution

Electricity - Basic principles - practical unit of electricity - International system (S.I) of units - Electric shock - precautions to avoid electric shock - Rescue steps in electric shock - methods of resuscitation - Electric Line Circuit Breaker (ELCB).

Unit - II : Wiring

Wiring system - Electric supply to house and factories - Types of wiring - ISI Rules - megger testing - Earthing. Electricity in house - Design for heating element - Electric iron, Table heater, Hot plate and Room heater.

Unit - III : Electrical Measuring intruments

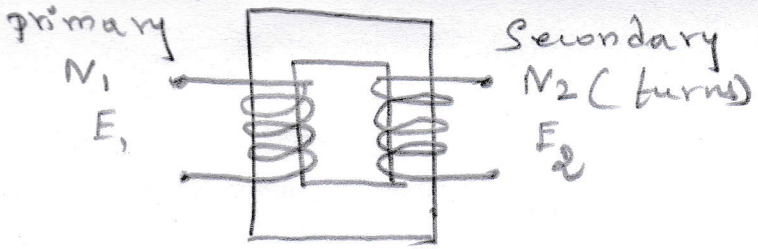
Moving Coil instruments - voltmeter - Ammeter - wattmeter - kilowatt meter - Frequency meter - multimeter

Unit - IV : Electrical appliances

cooling appliances - Electric fan - Refrigerator - Air conditioner - Air cooler. other Electrical appliances : Electric bell - Buzzer - Incandescent lamp - Fluorescent lamp - LED lamp - Halogen lamp - Reverse osmosis purifier - Washing machine - Solar powered street lights.

Unit - V : Electromagnetic application

Basics of electromagnetic theory - Solenoid - Electric motor (AC & DC) - Electric generator - transformer - Backup power Suppliers (UPS, Invertors) - Induction stove.



(*) A transformer is a device used in the power transmission of electric energy.

Electric generator transformer:-

(*) It is commonly used to increase or decrease the supply voltage without a change in the frequency of AC between circuits.

(*) The transformer works on basic principles of electromagnetic induction and mutual induction.

Solenoid :-

(*) A solenoid is a long coil of wire closely wound in the form of helix as shown in fig. When electric current is passed through the solenoid the magnetic field is produced.

(*) The magnetic field of the solenoid is due to the superposition of magnetic field of each turn of the solenoid.

(*) The direction of magnetic field due to solenoid is given by right hand palm - rule (mnemonic).

10/6/22

Dr. M.K MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
...KOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

Dr.J.PARASURAMAN, M.A., M.B.A., M.C.A., M.Phil., B.Ed., Ph.D
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422

R. Shanthi
Assistant Professor
Department of Physics
J.J. college of Arts & Sci,
Pudukkottai.

	1	2	3	4	5
D_1			III UG A	I UG	III UG A
D_2	← III UG A		→		I UG
D_3	← I UG		→		III A UG
D_4	I UG		←	III UG A [CS] →	
D_5					I UG
D_6		III A UG		I UG	III UG A

1. Mechanics – U2RIPHCC3
2. Elements of theoretical physics } – U6RIPHCC13

SEMESTER-II: CORE COURSE-III: MECHANICS – Skill Development		
Course Code : U2R1PHCC3		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- To study the effect of impact of two bodies.
- To have a knowledge in the field of dynamics
- To study the motion of freely suspended bodies.
- To understand the concepts of centre of gravity and centre of pressure.
- To understand the concepts of hydrodynamics.

UNIT- I: PROJECTILE, IMPULSE AND IMPACT **12 Hrs**

Projectile – motion of a particle projected horizontally from a point above the earth – particle projected in any direction – path of a projectile is a parabola – range of a projectile on a plane inclined to the horizontal – impulse of a force - impact - laws of impact –oblique impact of a smooth sphere on a fixed smooth plane – direct and oblique impact of two smooth spheres – loss in kinetic energy due to direct and oblique impact.

UNIT-II: DYNAMICS OF RIGID BODIES **11 Hrs**

Moment of inertia – parallel and perpendicular axes theorem – moment of inertia of a thin circular ring - moment of inertia of a circular disc - M.I of a cylinder about an axis perpendicular to its length – M.I of a hollow cylinder about an axis passing through the centre and perpendicular to the length – M.I of a hollow cylinder about its own axis -M.I of a solid sphere – M.I of a hollow sphere - Kinetic energy of a rotating body – angular momentum of a rotating body.

UNIT –III: SIMPLE HARMONIC MOTION **11 Hrs**

Definition – Theory of free vibrations – damped vibrations – forced vibrations – sharpness of resonance – power dissipation and quality factor – compound pendulum – determination of 'g' and radius of gyration of a compound pendulum – Kater's pendulum-determinations of 'g'.

UNIT-IV: GRAVITATION AND CENTRE OF GRAVITY **12 Hrs**

Universal law of gravitation –Kepler's laws of planetary motion – Boy's method of determination of G - gravitational potential and field due to solid sphere – variation of g with altitude -centre of gravity of an arc of a circle and sector of a circle – centre of gravity of solid and hollow hemisphere – centre of gravity of a solid tetrahedron.

Date : 05/05/22 Dayorder: 5 Hour: 4

Oblique impact of a smooth sphere

By Newton's experimental law

$$v\cos\theta = eu\cos\alpha$$

The velocity of the sphere resolved parallel to the plane is

$$v\sin\theta = u\sin\alpha$$

$$v^2 = u^2(\sin^2\alpha + e^2\cos^2\alpha)$$

This equation give the velocity and direction of the sphere after impact.

Date : 06/05/22 Dayorder: 6 Hour: 4

Direct impact of two smooth sphere

By the Principle of conservation of momentum

$$m_1v_1 + m_2v_2 = m_1u_1 + m_2u_2$$

By Newton's experimental law

$$v_1 - v_2 = -e(u_1 - u_2)$$

$$v_2 = \frac{m_1u_1(1+e) + u_2(m_2 - em_1)}{(m_1+m_2)}$$

give the velocities

Dr. M. Abdur Rahman
Asst. Prof of Physics
Dept of Physics
J.J college of Arts & Science
Pudukkottai.

2022 even Sem

Day / hr	I	II	III	IV	V
D_1	II CS	–	II CS	–	I M.Sc
D_2	← III B.Sc CS 'C' →			–	–
D_3	–	II CS	–	I M.Sc	–
D_4	II B.Sc ←	CS 'B' →		–	II CS
D_5	III UG 'B'	–	III UG 'B'	II CS	–
D_6	–	II CS	← III	UG 'B' Practical →	

1) Quantum Mechanics : U6R1PHCC6

2) Microprocessor and its applications : U6R1PHCC14

SEMESTER VI Microprocessor and its application.

Course code: U6RIPHCC14.

unit 1 : Microprocessor Architecture

Intel 8085 - ALU - timing and control unit - Registers - Data and address busses - pin configuration - opcode and operands - Instruction and data Formats - Addressing modes.

unit II : Instruction set for 8085

Intel 8085 Instructions - Instruction cycle - fetch operation ; execute operation - Machine cycle and state - Instruction and dataflow - timing diagram - timing diagram for opcode fetch cycle memory read - I/o read - memory write - I/o write.

unit -III - Assembly Language programming

8-bit addition - 8- bit subtraction - 8-bit multiplications - 8 bit division - sum of series - Data transfer - addition of multibyte numbers - smallest numbers in an array - largest numbers in an array - arrays in ascending order - array in descending orders - square root of a numbers

unit IV - Peripheral devices And their Interfacing

Address space Partitioning - memory and I/o interfacing - data transfer schemes - I/o ports - Interrupts of Intel 8085 - programmable peripheral interface 8255 - DMA controller 8257 - programmable timer / counter 8253

Memory Read:-

In a memory read cycle the microprocessor reads the content of a memory location. The content is then places either in the accumulator or any other given register of the CPU.

I/O Read:-

In an I/O read cycle the microprocessor reads the data available at an input port or input device.

Memory write:-

In a memory write cycle the CPU sends data form the accumulator or any other registers to the memory.

I/O write:-

In an I/O write cycle the CPU sends data to an I/P port or I/O device from

Dr. S. Geetha
Asst. Prof. of Physics
TJC, Pudukkottai

2021 – 22 – Odd Semester

1. Thermal physics – U3R1PHCC4
2. Condensed matter of Physics – P3R1PHCC10
3. Mathematical physics – P1R1PHCC1

Day / Hr	1	2	3	4	5
D1		II PG			
D2	II PG			II UG	
D3	←	II UG	→		
D4	II UG		II UG		
D5	II PG		←	II Chemistry Lab	
D6	←	II PG	→	II UG	

Day / Hr	1	2	3	4	5
D1		II PG	I PG		
D2	II PG		I PG	II UG	
D3	←	II UG	→		
D4	II UG	I PG			II UG.
D5	II PG		←	II Chemistry Lab	
D6	←	II PG	→	II UG.	

SEMESTER-III: CORE COURSE-IV: THERMAL PHYSICS		
Course Code : U3R1PHCC4		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To study about the nature of heat
- Tolearn the concepts of thermodynamics
- To study the basic concepts of statistical Physics
- To learn experimental methods to determine the transmission of heat
- To Know and analze Maxwell's thermo dynamical relations and their importance

UNIT-I: THERMODYNAMICS

Zeroth law of thermodynamics –First law of thermodynamics – Heat engines – Reversible and irreversible processes of Carnot's theorem – Second law of thermodynamics, Thermodynamic scale of temperature – Entropy – Change of entropy in reversible and irreversible processes – Temperature – entropy diagram(T.S) – Law of increase of entropy – Maxwell thermodynamical relations – clausius's – claypeyron's latent heat equations.

UNIT-II: LOW TEMPERATURE

Joule – Thomson's effect – Porous plug experiment – Liquefaction of gases – Linde;s method – Adiabatic demagnetionzation – Liquefaction of He – Particalapplicatons of low temperature – Refrigerating mechanism – Air conditioning machines.

UNIT-III: RADIATION

Radiation – stefan's law Deduction of Newton's law from Stefan's law – Boltzmann's law – Black body radiation – Wein's law – Rayleigh – Jean's law – Planck's law – Angstrom Pyroheliometer – Solar constant – Surface temperature of sun Sources of solar energy – Some everyday applications.

UNIT-IV: SPECIFIC HEATS.

Specific heat of solids – Einstein's theory of specific heat – Debye's theory – specific heat of gases – Mayer's Relation – Quantization of various contributions to energy of diatomic molecules – Specific heat of diatomic gases – (Quantum theory)

UNIT-V: STATISTICAL PHYSICS

Phase space – Statistical Equilibrium – Microstates and Microstates – Maxwell – Boltzmann statistics – Application of M-B statistics to molecular energies in an ideal gas – B-E statistics –Application of B-E statistics to photon gases – F-D statistics – Application of F-D statistics to electron gas – Comparison of three statistics.

UNIT-VI: LATEST LEARNING

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Brijilal, and subramaniyam, Heat and Thermodynamics, S. Chand &Co.(2016).
2. J.B.Rajam and C.L Arora, Heat and Thermodynamics.

Books For Reference:

1.Gupta S.L.&Kumar V., Statistical Mechanics, PragatiPrakashan,Meerut,2006

$$E(\nu) = \left[\frac{8\pi h\nu^3}{c^3}\right]\left[\frac{1}{e^{h\nu/kT}-1}\right]$$

$$E(\lambda) = \frac{8\pi hc}{\lambda^5}\left[\frac{1}{(e^{h\nu/\lambda kT})-1}\right]$$

D1/3.

22/10/21

Comparison of three statistics:

	M-B	F-D	B-E
1.	Particles are distinguishable	Indistinguishable	Indistinguishable
2.	Only Particles are taken into consideration	Only quantum states are taken	quantum states are taken.
3.	Volume in 6-d is not known	$V=h^3$	$V=h^3$
4.	Applicable to ideal gas molecules	Applicable to e^-s of high Concentration	Applicable to photons

16/10/22

Dr. M.K. MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
P.G. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous) ★ PUDUKKOTTAI ★

Dr.J.PARASURAMAN, M.A., M.Ed., M.Phil.,
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram P.O.
PUDUKKOTTAI - 622 422

paper: Atomic and molecular Spectroscopy

paper Code: P3R1PHCC11

Unit

Dr. K. Dhanabalan
Assistant professor/physics

Paper title:

1. Atomic and Molecular spectroscopy P3R1PHCC11
2. Applied Physics -I - U3R1APHAC1

Sub: Atomic and molecular spectroscopy

Sub code: P3B1PHCC11

Unit-I: Atomic spectra

Quantum states of electron in atoms - Hydrogen atom spectrum - Electron spin - Stern - Gerlach experiment - Spin-orbit Interaction - Two electron systems - LS-JJ Coupling schemes - Fine structure - Spectroscopic terms and selection rules - Hyperfine structure - Alkali type spectra - Equivalent electrons - Hund's rule.

Unit-II: Atoms in external Fields and quantum chemistry

Atoms in External fields: Zeeman and paschen back effect of one and two electron systems - selection rules - stark effect.

Quantum chemistry of molecules: Covalent, ionic and van der waals interactions - Born-oppenheimer approximation - Heitler-London and molecular orbital theory

28/10/21 DAY 4 Month

The effect of Isotopic Substitution

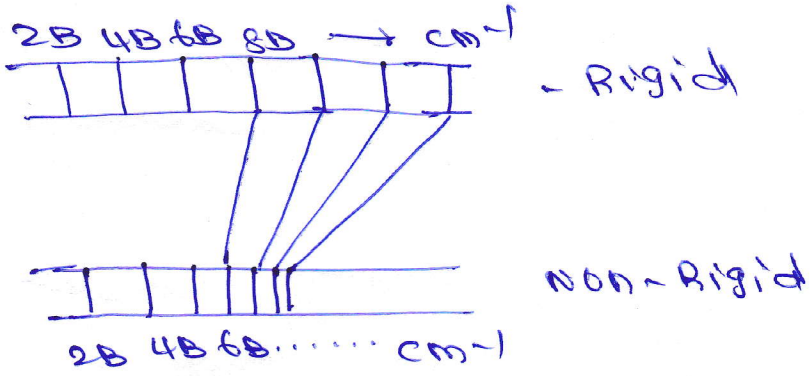
* When a particular atom in a molecule is replaced by its isotope - an element identical in every way except for its atomic mass.
* In particular there is no appreciable change in intermolecular distance on isotopic substitution.
* Consider carbon monoxide as an example $^{12}C\,^{16}O$ to $^{13}C\,^{16}O$.
* $B > B'$
* $B = 1.92118\ cm^{-1}$ & $B' = 1.83669\ cm^{-1}$

$$\frac{B}{B'} = \frac{h}{8\pi^2 I_c} \cdot \frac{8\pi^2 I'_c}{h}$$

30/10/21 DAY 6 Month

$$= \frac{I'}{I} = \frac{\mu'}{\mu} = 1.046$$

The non-rigid rotator :-

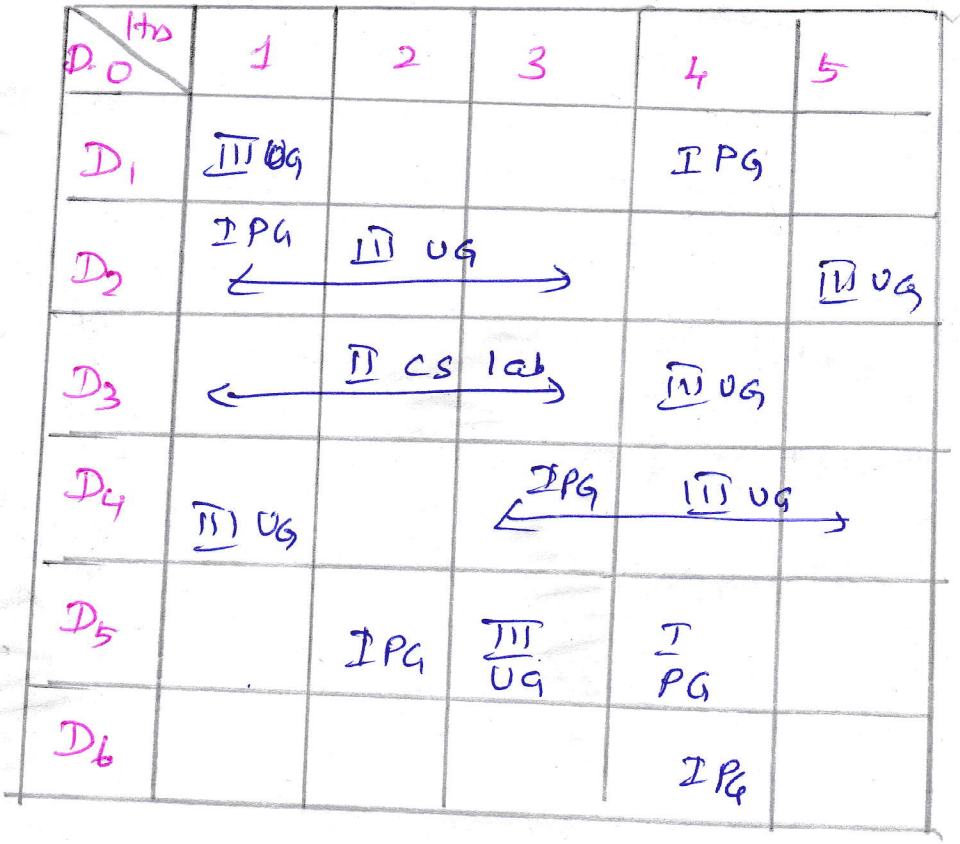


* It's evident that the separation b/t successive lines decreases steadily with ↑ J.
* (ii). When the bond is elastic, a molecule

To be continued vibrational energy

Dr. M. Bhuvaneswari
Assistant Professor
T.T. College of Arts & Science
Pudukkottai

30/3/2037


D.O
Hrs
1
2
3
4
5
D1
III UG
I PG
D2
I PG
III UG
III UG
D3
II CS lab
IV UG
D4
II UG
I PG
III UG
D5
I PG
III UG
I PG
D6
I PG

Semester I – Core course – II

CLASSICAL MECHANICS

Course code : P1R1PHCC2

UNIT - I: FUNDAMENTALS OF CLASSICAL MECHANICS **14 Hrs**

Mechanics of a particle and system of particles – Conservation laws – Constraints – Generalized coordinates – D'Alembert's principle and Lagrange's equation – Hamilton's principle – Lagrange's equation of motion – conservation theorems and symmetry properties – Motion under central force : General features – The Kepler problem Scattering in a central force field.

UNIT -II: LAGRANGIAN FORMULATION: APPLICATIONS **13 Hours**

a) Rigid Body Dynamics
Euler angles – Moments and products of inertia – Euler's equations – Symmetrical top.
b) Oscillatory Motion
Theory of small oscillations – Normal modes and frequencies – Linear triatomic molecule
Wave motion – wave equation – Phase velocity – Group Velocity dispersion

UNIT -III: HAMILTON'S FORMULATION **14 Hrs**

Hamilton's canonical equations of motion – Hamilton's equations from variational principle – Principle of least action – Canonical transformations – Poisson brackets – Hamilton – Jacobi method – Action and angle variables – Kepler's problem in action – angle variables.

UNIT -IV: NON-LINEAR DYNAMICS **14 Hours**

Linear and nonlinear oscillators- phase trajectories –classification of equilibrium points in planer systems-invariant manifolds stable, unstable center manifolds- periods orbits limitcycles, poincare maps and floquet theory- Poincare bendison theorm

UNIT -V: RELATIVISTIC MECHANICS **14 Hours**

Reviews of basic ideas of special relativity – Energy momentum four vector – Minkowski's four dimensional space – Lorentz transformation as rotation in Minkowski's space – Compositions of L.T. about two orthogonal directions – Invariance of Maxwell's equations under Lorentz transformation – Elements of general theory of relativity.

UNIT-VI: LATEST LEARNING **3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

Books for study

1. Classical Mechanics, H.Goldstein, Narosa Book distributors, New Delhi (1980)
2. Nonlinear Dynamics M.Lakshmanan and S.Rajasekar:: Integrability, Chaos and
3. Patterns, Springer – Verlag, Berlin (2003), Springer (India) 2004
4. Chaos in Nonlinear Oscillators,M.Lakshmanan and K.Murali: world Scientific Co., Singapore (1996). Chapters 2-4.

Books for Reference

1. Classical Mechanics N.C.Rana and P.S.Joag, Tata

4) What are action angle variables?

A set of variables that has a canonical transformation and can simplify the phase-space motion are called ~~any~~ action-angle variables.

$$J = \oint p.dq.$$

the actions are integrals of motion and the angles are evolving linearly with time with constant frequencies which depend on actions.

5) what do you know about point transformation?

* Generalising the form, the transformation from one set of co-ordinates q_j to a new set Q_j can be expressed as

$$Q_j = Q_j(q_j, t)$$

Such transformations are called point transformations.

* Here the configuration space provides information about only position co-ordinates (q_j) and not velocities ($\dot{q}_j$)

So, $Q_j = Q_j(q_j, t)$ are referred to as the transformations of the Configuration space or point transformations.

Dr.J.PARASURAMAN, M.A., M.B.A., M.Phil.,
MURALI, M.Sc., M.Phil., Ph.D
ASSISTANT PROFESSOR,
DEPARTMENT OF PHYSICS
SCIENCE (AU),

Name Dr. M. BHUVANESWARI

Std ______ Sec ______ Roll.No ______

School Assistant professor of physics

Subject OPTICS

INDEX

No	Date	Title	Marks	signature

III U.G - optics U5RIPHCC8

I P.G - classical dynamics P1R1PHCC2

D.O \ Hrs	1	2	3	4	5
D_1	III UG			I P.G	
D_2	I PG	← III UG lab →			III UG
D_3	←	II CS lab →		III UG	
D_4	III UG		I PG ←	III UG lab →	
D_5		I PG	III UG	I PG	
D_6				I PG	

Syllabus

Semester - V Core Course - VIII : OPTICS

Course code : U5RIPHCC8

Unit : I

Interference

Principle of Superposition - Interference - Theory of interference - Young's Double slit experiments - Fresnel biprism - Experimental arrangement - Determination of wavelength of light - plane parallel film - Interference due to reflected light - Variable thickness film (Air wedge) - Theory of Newton's Rings - Michelson interferometer and its applications - Determination of wavelength and difference in wavelength.

Unit : II : Diffraction :

Fresnel's diffraction - Diffraction at (i) Circular aperture (ii) Straight edge (iii) narrow wire - Fraunhofer's diffraction at a single slit and double slit - Missing orders in a double slit - Diffraction pattern - Theory of plane transmission grating - Oblique incidence - Overlapping of Spectral lines - prism and grating spectra - Resolving power of a grating - Dispersive power of a grating.

Unit : III : Polarization :

Polarization of transverse waves - Nicol prism - Nicol prism as an analyzer and polarizer - Huygen's explanation of double refraction in uniaxial crystals - Double image polarizing prisms - Elliptically and Circularly polarized light - Production and detection - Quarterwave and half waveplate - Babinet's Compensator - optical activity - Fresnel's explanation of optical activity - Laurent's Halfshade polarimeter.

Unit IV : Aberrations :

Aberration - Spherical Aberration in a lens - Reducing spherical Aberration - curvature of the field - distortion - Dispersion by a prism - chromatic Aberration - Achromatic lenses and condition for Achromatism when two lenses are in contact - Achromatism of a camera lens.

Unit V : Eyepiece and Resolving power of optical instruments.

Field lens - Ramsden's eyepiece - Huygen's eyepiece and its cardinal points - Comparison between Huygen's and Ramsden eyepiece - Resolving power - Rayleigh's Criterion of resolution Resolving power of a (i) telescope (ii) prism (iii) Grating - Dispersive power of a grating.

Unit VI : Latest Learning Latest development related to the course during the Semester concerned (CIA purpose only not for qn. setting)

Books for study : (i) Text book of optics by Brijlal and Subramanian and ava dhanulu, M.N.S. chand & company New Delhi 2012.

when principal plane is ⊥ to xcy it is equally inclined to the polarized beams, Hence the two halves of the field appear equally illuminated.

Th 2 p
10/10/22

Dr. M.K. MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous) PUDUKKOTTAI

Dr.J.PARASURAMAN, M.A.,M.B.A.,M.C.A
M.Phil.,B.Ed.,Ph.D
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422

R. SHANTHI
Assistant Professor
Department of Physics
J.J. College of Arts
& Science (A)
Pudukkottai

	1	2	3	4	5
D_1	← I UG		→		I UG
D_2	← II UG		→	I UG	III UG
D_3	III UG				I UG
D_4		III UG	← III UG		→ I UG
D_5	I UG	III UG			
D_6	III UG	I UG			

SEMESTER-I: CORE COURSE-I - PROPERTIES OF MATTER AND SOUND – Skill Development		
Course Code : U1R1PHCC1		**Max. Marks : 100**
Hours/Week : 6		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To study the basics of elasticity and its importance.
- To gain the knowledge of bending of beams
- To study the concepts of surface tension
- To acquire the knowledge of viscosity.
- To study and understand the concepts of sound.

UNIT-I: ELASTICITY **14 Hrs**

Stress – stain diagram – Hooke's law – different moduli of elasticity (E, G, K) – relation between the elastic moduli – Poisson's ratio –determination of Poisson's ratio for rubber – torsion of a body–expression for torque per unit twist – determination of rigidity modulus by static torsion method (Searle's apparatus) – work done in twisting a wire – torsional oscillations of a body – rigidity modulus by torsion pendulum (wire).

UNIT-II: BENDING OF BEAMS **14 Hrs**

Introduction – expression of bending moment – expression for the depression of the loaded end of a cantilever – young's modulus by cantilever depression – oscillations of a cantilever – non-uniform bending – expression for depression – uniform bending – expression for elevation – experiment to determine young's modulus using pin and microscope (uniform and non uniform bending) –experiment to determine young's modulus by Koenig's method.

UNIT-III: SURFACE TENSION **14 Hrs**

Definition and dimension of surface tension –molecular forces – explanation of surface tension on kinetic theory – excess pressure inside a liquid drop and a soap bubble – excess pressure inside a curved liquid surface – experimental determination of surface tension by Jaeger's method, drop weight method – interfacial surface tension – experiment to determine interfacial surface tension between water and kerosene.

UNIT-IV: VISCOSITY **14 Hrs**

Definition and dimension of viscosity– streamline and turbulent flow– Reynold's number –Poiseuille's formula for flow of liquid through a capillary tube – Poiseuille's method for determining coefficient of viscosity of a liquid (variable pressure head) – Ostwald's viscometer-Stokes method for coefficient of viscosity of a liquid – viscosity of gas – modification of Poiseuille's formula for gases.

Date: 29/12/21 Dayorder: 4 Hour: 5

Rigidity modulus by Torsion Pendulum

The torsion Pendulum consists of a wire with one end fixed in a split chuck and the other end to the centre of circular disc.

$$I_0 = \frac{2m(d_2^2 - d_1^2)\, T_0^2}{T_2^2 - T_1^2}$$

Q

Date: 30/12/21 Dayorder: 4 Hour: 5

Torsional oscillations of a body

Suppose a wire is clamped vertically at one end and the other end carries a body of moment of inertia I about the wire as the axis

The Potential energy of the wire due to the twist $= \frac{1}{2} C \cdot \theta^2$

The body has simple harmonic motion and its period is given by

P. Menaka
Asst. Prof in Physics
J.J. College of Arts and Science
Pudukkottai.

Academic year : June 2021 - Nov-2021
Odd Semester

1. Biomedical Instrumentation - U5RIPHSBE2
2. Applied Physics - I - U3RIPHAC1
3. Mathematical physics - P1RIPHCC1

ONLINE

Day Order	1	2	3	4	5
D_1		II CS UG 'A'			Phys. III UG 'A'
D_2		II UG CS 'A'			II UG CS 'A'
D_3					III Phys 'A'
D_4				II UG CS 'A'	
D_5		II UG CS 'A'			
D_6			III Phy 'A'	II UG CS 'A'	

OFF LINE

Day Order	I	II	II	IV	V
D_1	III Phy 'A'		←	II PG Phys →	
D_2	←	II UG A (a&b)	CS →	I PG Phys	
D_3	II UG Lab ←	CS (B')	II UG CS A		II UG CS 'A'
D_4	I M.Sc phy		I M.Sc phy	II UG CS A	
D_5	II UG CS 'A'			II UG CS 'A'	III Phy 'A'
D_6					II UG CS A

Subject: Biomedical Instrumentations

Subject code: U5RIPHSBE2

Unit - I : Bioelectric potential

Resting and action potentials - Propagation of action potentials - Bioelectric potentials : The electrocardiogram (ECG) - The electroencephalogram (EEG) - The electromyogram (EMG) - other bioelectric potentials.

Unit - II : Biopential Electrodes.

Electrode theory - Micro electrodes - Body surface electrode - Needle electrode - Reference electrode - pH electrode - Blood gas electrode - Specific ionelectrod

Unit - III : Cardiovascular Measurements.

Electrocardiography - ECG Amplifier - Electrodes & leads ECG Recorder principles - Measurment of Blood pressure Indirect measurement - Measurement of Blood flow and Cardiac output.

Unit - IV : Nervous Measurements.

Anatomy - Neuronal Communication - Neuronal Receptors - Measurements from the nervous System - Neuronal firing measurements - EMG measurement Computerized axial tomography.

Unit - V : Ultrasonic Measurements.

Date: 21/10/2021 Dayorder: D1 Hour: 1

Ultrasonic diagnosis

* It is also called ultrasonography in medicine. The use of high frequency Ultrasonic waves to produce images of structures within the human body. Ultrasonic waves are produced by electrical stimulation of piezo electric crystal and can be aimed at a specific area of the body.

* Reflected echoes are received by an electronic apparatus that determines the intensity level of the echoes and position of the tissure giving rise to the echoes.

* Sound waves are less potentially harmful to human tissues than are x-rays or other ionizing radiations. Because it is an invasive preedure. It is used to provide images of the heart, lives, kidneys and eyes, and also used to diagnose tumours.

* It is expensive method

P. Parameswari,
Assistant professor,
Department of physics,
J.J. College of Arts and Science,
Pudukkottai.

Academic year : June 2021 – November 2021

1. Allied physics - I - U3R1PHtAC4 (UG)
2. optics - U5R1PHCC8 (UG)

	1	2	3	4	5
D_1	III phy		II che		II che
D_2	II che		←	III phy lab →	
D_3	II che		III phy		
D_4	←	III phy lab →			II che
D_5	III phy		←	II Bsc che lab →	
D_6	III phy			III phy	II che

SEMESTER-V: CORE COURSE-VIII: OPTICS – Skill Development		
Course Code : U5R1PHCC8		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- To study about the principles of geometrical and physical optics
- To understand the interference, diffraction and polarization of light
- To understand the aberration in lenses.
- To understand basic principles of optical instruments.
- To understand the working of optical instruments.

UNIT-I: INTERFERENCE **12 Hrs**

Principle of Superposition – Interference –Theory of interference - Young's Double slit experiments–Fresnel biprism – Experimental arrangement –Determination of wavelength of light-plane parallel film-Interference due to reflected light-Variable thickness film(Air wedge) — Theory of Newton's Rings -Michelson interferometer and its applications – Determination of wavelength and thickness of thin transparent sheet – Fabry -Perot interferometer-Determination of wavelength and difference in wavelength.

UNIT-II: DIFFRACTION **12 Hrs**

Fresnel's diffraction–Diffraction at a (1) circular aperture (2) Straight edge (3) narrow wire.– Fraunhoffer's diffraction at a single slit and Double slit–Missing orders in a Double slit - Diffraction pattern–Theory of the plan transmission grating-Oblique incidence–Overlapping of spectral lines– prism and grating spectra – Resolving power of a grating – Dispersive power of a grating.

UNIT-III: POLARIZATION **11 Hrs**

Polarization of transverse waves –Nicol prism–Nicol prism as an analyzer and polarizer–Huygens's explanation of Double refraction in uniaxial crystals–Double Image polarizing prisms–Elliptically and circularly polarized light – Production and detection – Quarter wave and half wave plate – Babinet's compensator–Optical activity–Fresnel's explanation of optical activity–Laurent's Half shade polarimeter.

UNIT- IV: ABERRATIONS **11 Hrs**

Aberration-Spherical Aberration in a Lens-Reducing Spherical Aberration- Curvature of the field -distortion- Dispersion by a prism - Chromatic Aberration - Achromatic lenses and condition forAchromatism when two lenses are in contact – Achromatism of a camera Lens.

11 H

UNIT - V: EYEPIECE AND RESOLVING POWER OF OPTICAL INSTRUMENTS

Field lens - Ramsden's eyepiece- Huygens's eyepiece and its cardinal points – comparison between Hygen's and Ramsden Eyepiece. Resolving power – Rayleigh's criterion of resolution .Resolving power of a (i) telescope (ii) Prism (iii) Grating – Dispersive power of a grating.

UNIT-VI: LATEST LEARNING **3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FORSTUDY:

1. Text Book of Optics by Brijlal and Subramaniam and avadhanulu. M.N, S. Chand and Company New Delhi (2012).
2. Optics by Khanna and Gulati Mc Graw Hill Education Ltd New Delhi (2017).
3. Optics and spectroscopy by R. Murugeshan and Sivaprasath Kiruthiga. S.Chand and co Ltd(2010).

31/12/21 D_5 1

Half wave plate :-

⇒ To produce a Path difference of $\lambda/2$ in calcite

$$(\mu_o - \mu_e)\, t = \lambda/2$$

$$t = \frac{\lambda}{2(\mu_o - \mu_e)}$$

and in case of quartz

$$t = \frac{\lambda}{2(\mu_e - \mu_o)}$$

⇒ Thus, a half wave plate rotates the azimuth of a beam of plane polarized light by 60° provided the incident light makes an angle of 45° with the optic axis of the half wave plate

Current semester note.

2021

V

mr. S. Sasikumar
Assistant professor
Department of physics
J.J. College of Arts & Science
Pudukkottai - 622422

Time Table :-

Day / Hour	I	II	III	IV	V
D1	—	II CS 'C'	III UG 'B'	II PG	—
D2	← II CS 'B' Lab →			II CS 'C'	II PG
D3	← II CS 'C' Lab →			—	II PG
D4	III UG 'B'	—	—	—	II CS 'C'
D5	—	—	II PG	—	II PG
D6	II CS 'C'	—	II PG	—	II CS 'C'

Biomedical Instrumentation:

Unit - I : Bioelectric potentials

Resting and action potentials - propagation of action potentials - Bioelectric potentials: The electrocardiogram The electroencephalogram (EEG) - The electromyogram Other Bioelectric potentials.

Unit - II : Biopotential Electrodes

Electrode theory - microelectrodes - Body Surface electr Needle electrode - reference electrodes - pH electrode - Blo gas electrode - specific ion electrode.

Unit - III : Cardiovascular measurements

Electrocardiography - ECG amplifiers - Electrodes & lea ECG Recorder principles - measurement of Blood press Indirect measurement - measurement of Blood flow and cardiac output.

Unit - IV : Nervous measurements

Anatomy - Neuronal communication - Neuronal Receptors - measurements from the nervous syste Neuronal firing measurements - EMG measureme Computerized Axial Tomography.

Unit - V : Ultrosonic and X-ray measurements

Basic modes of transmission - Ultrasonic Imaging - Ultrasonic diagnosis - ultrasonic transducers - Opthlmic Scans - Instrumentation for diagnosis - X-rays - special techniques.

* The internal structure of human body : different densities.
* When x-ray is allowed to penetrate the body, the body absorbs varying amount of radiation.
* The radiation coming out of the body after absorption has a spatial intensity variation that is an image of the internal structure of the body under study.

X-ray images using special techniques :-

* Bucky Diaphragm or Grid
* Contrast media
* Angiography
* Cardiac catheterization
* Three - dimensional visualization

10/10/22

Dr. M.K. MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous) * PUDUKKOTTAI *

Dr.J.PARASURAMAN, M.A., M.B.A., M.C.A., M.Phil., B.Ed.,
PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422

Senthil kumar. G
Assistant Professor
Department of Physics,
JJ College of Arts & Science (Autonomous)

1. II BSc CS 'B' — Applied Physics - I.
2. III BSc - 'B' (Phy) — Digital Electronics.

Day	1	2	3	4	5
D1		II Allied			
D2	← II CS - 'B' Lab →				III UG.
D3		II Allied		III UG.	
D4	II Allied		← III UG Lab. →		
D5		III UG.		II Allied.	
D6	← III CS - B Lab →			II Allied.	

Digital Electronics.

Course code : U5RPHCC10.

Unit - 1 : Number Systems And Logic Gates

Introduction to decimal, binary, octal hexdecim
Number system - Interconversions - one and two
complements - simple binary arithmetic operation
Addition, subtraction and multiplication - Binary
subtraction using one and two complement - posi
and negative logic - Basic and derived logic gate
symbols and their truth tables - AND, OR, NOT, NA
NOR, XOR and XNOR - Universality of NAND and NOR g

Unit - 2 : Boolean Algebra And simplification Logic Expressions.

Boolean algebra - Basic laws of Boolean algebra -
De-Morgan's theorems, Reducing Boolean expressi
using Boolean laws - sop and pos forms of expressi
minterms and maxterms - Karnaugh map simplifi

Unit - 3 : Combinational Digital system.

Half and full adders - Binary adders - Half and f
subtractors - Binary subtractor two complement
adder/subtractor circuits - Decoder & Encoder
Multiplexer - Demultiplexer - A/D conversion -
Successive approximation method - D/A converter
R-2R ladder network.

Unit - 4 : Sequential Digital system.

Flip flop - RS - clocked RS - T and D flip flops - J
and master slave flip flops - Counters - four bit
asychronous ripple counter - Ring counter - Syn
counter - Decade counter - Shift registers - SISO
shift registers.

Unit - 5 : MEMORIES

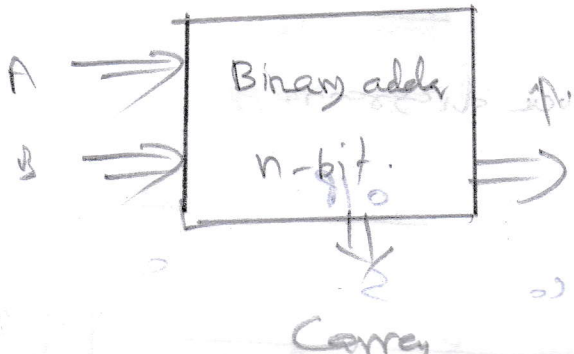
Introduction - semiconductor memories - memory
addressing - ROMs - PROMs and EPROMs - Ran
access memory - Dynamic random access mem

28/9/22

Binary parallel adder:

It can build binary adders of any length. Eg. 16bit (or) 15 bit.

Block diagram



C → 1110

A → 0111

B → 0101

1100

10/10/22

Dr. M.K. MURALI, M.Sc., M.Phil., Ph.D
HEAD AND ASSISTANT PROFESSOR,
PG. AND RESEARCH DEPARTMENT OF PHYSICS
J.J. COLLEGE OF ARTS AND SCIENCE (AU),
J.J. NAGAR, SIVAPURAM,
PUDUKKOTTAI - 622 422.

J.J. COLLEGE OF ARTS AND SCIENCE (Autonomous) PUDUKKOTTAI

Dr.J.PARASU. M.C.A., M.Phil.,B.Ed.,Ph.D

PRINCIPAL
J.J. College of Arts and Science
(Autonomous)
J.J. Nagar, Sivapuram Post,
PUDUKKOTTAI - 622 422

Dr. M. Abdur Rahman
Asst. prof of Physics
Dept. of Physics
J.J. College of Arts & Science
Pudukkottai.

2021 - 2022 odd sem

Day order	I	II	III	IV	V
1			III UG A		II PG
2	← II BSc CS 'B'			III UG A'	II CS 'B'
3	← II BSc CS 'C'		→		III UG A
4	II PG		III UG A	II CS B	
5	III UG A		I CS 'B'		
6	II CS B		III UG A		II PG

1) Condensed Matter of Physics : P3R1PHCC10

2) Digital Electronics P5R1PHCC10

X Condensed Matter Physics P3RIPHCC10

Unit I: Crystal Physics

Crystals - Crystal lattice & translation vectors - Types of lattice (2D & 3D) - Point group - Space groups - Lattice direction & planes - Simple Crystal structure - closed packed & loose packed structures - Structure of diamond, Zinc blend & Sodium chloride - X ray diffraction - X ray diffraction methods (Laue's method, Power Crystal method) - Reciprocal lattice & its properties - Imperfection in crystals - Point defects - line defects.

Unit II: Semiconductors, Lattice Vibrations & Thermal property

Intrinsic & Extrinsic Semiconductors - General study of carrier movement - Fermi level & Conductivity - Lattice vibrations - One dimensional Monatomic lattice & diatomic lattice - Phonons - Phonon momentum - Lattice heat capacity - Classical theory (Dulong & Petit law) - Einstein theory - Debye's model - Density modes.

Unit III: Free Electron Theory & Band Theory of Solids

Drude - Lorentz's classical theory of free electron gas - Relation b/w thermal & electrical conductivity (Wiedemann Franz law) - Free electron gas - a 1D free electron gas in a 3D - Application of free electron gas model - Bloch theorem - Kronig - Penny model - effective mass of electron.

Unit IV: Dielectrics & Magnetism in Solids

Polarization & Susceptibility - Local field - Dielectric constant & Polarizability (Clausius - Mosotti equation) - Sources of polarizability - Ferro electricity - Piezo electricity - Classical & Quantum theory of Dia & Para magnetism - Weiss theory of ferromagnetism - Hunds rule - Concept of domains - Antiferromagnetism - Ferrimagnetism.

Unit V Superconductivity:

Introduction - The Meissner effect - Soft & hard superconductors - Thermo dynamical & Optical properties - Type I & Type II Superconductors - London equ - BCS theory - Quantum tunneling - Josephson tunneling - Theory of DC Josepho effect - Theory of AC Josephson effect - High Tc superconductors - SQUIDS - Applications of superconductors.

Books for Study:

1. Introduction to Solid State physics, C. Kittel, Wiley Eastern, New Delhi, 2008
2. Solid state physics, A. J. Dekker, Mc Millan, Madras 1971.
3. Solid State Physics, So. Pillai, New age International (P) Ltd, Revised 6th Edit
4. Solid State Physics, Gupta Kumar, K. Nath & Co, Meerut, 2011.

Books for reference:

1. An Introduction to X ray Crystallography, M.M. Woolfson, Cambridge University Press, Cambridge, 1991.
2. Solid State Physics N.W. Ashcroft & N.D. Mermin, Holt, Rinehart, & Winst Philadelphia.
3. Solid State Physics J.S Blakemore, Cambridge University press, Cambri 1985.

24-9-21

Theory of DC Josephson effect:-

The time dependent Schrödinger equation is

$$i\hbar \frac{d\psi_1}{dt} = \hbar T \psi_2$$

$$i\hbar \frac{d\psi_2}{dt} = \hbar T \psi_1$$

$$J = J_0 \sin\delta = J_0 \sin(\theta_2 - \theta_1)$$

25-9-21

AC Josephson effect:-

Let a voltage V be applied a the Josephson Junction.

$$i\hbar \frac{d\psi_1}{dt} = \hbar T \psi_2 - eV\psi_1$$

$$i\hbar \frac{d\psi_2}{dt} = \hbar T \psi_1 - eV\psi_2$$

$$J = J_0 \sin\left(\delta(0) - \frac{2eVt}{\hbar}\right)$$

$$\omega = \frac{2eV}{\hbar}$$

30-9-21

SQUIDS:-

Provides the basis for one fa of Josephson junction is called Squ The squid is a double junction Inter ferometer formed from two Superco