APPLIED PHYSICS FOR COMPUTER SCIENCE

THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS)

ELAMBALUR, PERAMBALUR – 621 220

PG & RESEARCH DEPARTMENT OF PHYSICS

VISION

To blossom as an institution of excellence, enabling, empowering and enlightening the youth and shaping them as fully developed human beings with the capacity to unfold their full mental potentiality resulting in the attainment of the wisdom to live constructively and meaningfully.

MISSION

- To provide congenial and stress- free environment and opportunities for the enhancement of knowledge and acquisition skills through the best exposure and training possible.
- To offer multifaceted and need-based academic programmes and to promote extension activities.
- To adopt technology-enabled new methods, approaches and techniques so that the teaching-learning process becomes learner-centred and learner-friendly.
- To maximize the participation of all the stakeholders in the development of the institution and the region.
- To sensitize the youth towards inclusive growth for socio-economic change, sustainable development, gender equality, eco-friendliness, etc.
- To enable the youth to experience the effects of globalization and facilitate them to grow as responsible citizens and leaders.
- To inspire them, through value-based education, to embrace the entire humanity while firmly rooted in the Indian ethos.
- To provide regular placement training and placement opportunities.
- To kindle the spirit of creativity and enhance research activities and enable them to attain international standards.

PROGRAMME OUTCOMES

Upon completion of the programme, the Undergraduate will be able to

1. Gain advanced knowledge resulting in entrepreneurship; innovation and newer opportunities for being employable in public and private sectors, research and development organizations.
2. Apply enhanced new techniques and adopt new technologies needed in the respective disciplines.
3. Appreciate the diversity of behavior in professional practice and act in accordance with the core values of chosen profession.
4. Demonstrate the knowledge, values and skills to be critical consumer of research practice and possess investigative skills to evaluate the practice.
5. Engage in lifelong learning process, have the ability to communicate the findings of Languages / Commerce / Management studies / Social Work / Computing Sciences / Physical Sciences / Biological Sciences / Life Sciences with the current knowledge.

PROGRAMME SPECIFIC OUTCOMES

1. Conceptual Knowledge and Awareness on the impact of Physics.
2. Observational acquired experimental skills measuring and computational techniques.
3. Problem analyzing and solving skill; understanding and logical thinking, reasoning and troubleshooting.
4. Acquire analytical and logical skill for higher education
5. Research orientated internship and employability enhancement.

Applied Physics for Computer Science
APPLIED PHYSICS-I

Applied Course: I
Course Code: 20UPH3AC3
Hours / Week: 4
Credit: 4

Semester: III
Maximum Marks : 100
Internal Marks : 25
External Marks : 75

Course outcomes

After successfully completing this course the student will be able to

- Understand the electric fundamental laws.
- Analyses the characteristics of alternating current and its applications.
- Understand the fundamentals of codes and number system.
- Understand the binary arithmetic, logic and Boolean functions.
- Understand the applications of semiconductor memories.

Unit I: Current Electricity

Ohm's Law - Verification of Ohm's Law - Kirchoff's law - Applications of Kirchoff's law - Wheatstone's bridge - Metre bridge- Carey Foster's bridge- Potentiometer Measurement of Current and Resistance- Calibration of low range Voltmeter.

Unit II: Alternating Current

AC circuits with double components – Measurement of current and voltage – Power in an AC circuit - Power factor (derivation) - Wattles current – Choke - Series and parallel resonant circuits – Impedance - Q factor - Selectivity and Sharpness of resonance.

Unit III: Number Systems, Codes and Logic gates

Number Systems - Conversions - Binary: Addition, Subtraction, Multiplication, Division-8421 Code - BCD Code - Excess 3 code - Gray code - Binary to Gray and Gray to Binary Conversion - ASCII code – Basic and Derivative Gates: AND, OR, NOT, NAND, NOR, EX-OR - NAND & NOR as Universal Gates.

Unit IV: Boolean algebra, Arithmetic and Combinational Logic Circuits

Basic laws of Boolean algebra - De Morgan's theorem - Verification of Boolean expression using Boolean laws - Half-adder - Full adder - Half-Subtractor - Full Subtractor (using basic gates) – Encoder - Decimal to BCD encoder- Decoder - BCD to decimal decoder.

Unit V: Semiconductor Memories

Introduction – ROM using diodes and transistors – ROM in terms of digital circuits – Building memory of larger capacity – PROM – EPROM – EEPROM – ROM as a unit in microcomputers – RAM – Static RAM – Flip Flop as a RAM cell – Memory expansion - Memory Parameters.

Books for study:

1. Brijlal& Subramanian, Electricity and Magnetism, RatanPrakashanMandir, 1995.(Unit I &II)

2. Puri V.K., Digital Electronics circuits and systems, Tata McGraw Hill publications, New Delhi, 2011.
(Unit III, IV&V)

References

1. Narayanamurthi and Nagarathinam, Electricity and Magnetism, The National Publishing Company,
Madras, 1994.
2. Jacob Millman, Integrated Electronics, TataMcGraw Hill publications, New Delhi, 2003.
3. Murugeshan.R, Electricity and Magnetism, S. Chand & Company Ltd., 2015.
4. Gothman W.H., Digital Electronics, Prentice Hall of India PVT., New Delhi, 1996.
5. Rajendran.V, Applied Physics, TATA McGraw hill publications, New Delhi, 2002.

Relationship Matrix for course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
I	20UPH3AC4		APPLIED PHYSICS-I			4			4	
Course Outcomes	Programme Outcomes					Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓			✓	✓	✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓		✓	✓	
CO3	✓			✓	✓	✓		✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO5	✓		✓	✓	✓	✓		✓	✓	✓
Number of Matches(✓) = 38, Relationship: High										

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relatioship	Very Poor	Poor	Moderate	High	Very High

Prepared By **Checked By** **HOD**

APPLIED PHYSICS –II

(PRACTICAL)

Allied Course: II
Course Code: 20UPH4AP2
Hours / Week: 3
Credit: 3

Semester: IV
Maximum Marks : 100
Internal Marks : 40
External Marks : 60

Course outcomes

After successfully completing this course the student will be able to

- Study the characteristics of diode, transistor and FET.
- Using techniques in electrical circuits.
- Study the logic gates and their truth tables.
- Analyze the theorems

Any Twelve

1. SemiConductor diode - Characteristics.
2. Zener diode – Characteristics.
3. FET- Characteristics.
4. Transistor Characteristics - CE configuration.
5. Transistor Characteristics-CB Configuration.
6. Metre Bridge-Specific Resistance.
7. Potentiometer-Measurement of Current.
8. Potentiometer-Calibration of low range voltmeter.
9. LCR - Series resonance circuit.
10. LCR - Parallel resonance circuit
11. Mathematical Operator-Addition, Subtraction using OP-Amp.
12. Logic Gates (AND, OR, NOT) Using discrete components.
13. NAND and NOR as Universal Gates.
14. Verification of De-Morgan’s Theorems.
15. Half Adder and Half Subtractor using logic gates.
16. Full Adder and Full Subtractor using logic gates.

References

1. Srinivasan M.N.,Balasubramanian S. &Renganathan R., A Text book of Practical Physics, Sulthan Chand & Sons, New Delhi, 2000.
2. Somasundram S., Practical Physics, Apsara Publications, Tiruchirappalli, 2012.

Relationship Matrix for course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
I	20UPH4AC5P		APPLIED PHYSICS-II			4			4	
Course Outcomes	Programme Outcomes					Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO4	✓	✓		✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches(✓) = 48, Relationship: Very High										

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relatioship	Very Poor	Poor	Moderate	High	Very High

Prepared By **Checked By** **HOD**

APPLIED PHYSICS-III

Allied Course: III
Course Code: 20UPH4AC4
Hours / Week: 4
Credit: 3

Semester: IV
Maximum Marks : 100
Internal Marks : 25
External Marks : 75

Course outcomes

After successfully completing this course the student will be able to

- Study the characteristics of diodes and FET
- Perform the procedures for the transistor working and biasing circuits.
- Understand the basic principle of laser and types.
- Perform the procedures into applications of Opto electronic devices.
- Study the Op-amps and its applications.

Unit I: Semiconductor Physics

Theory of energy bands in crystals- Distinction between conductors, Insulators and Semiconductors – Intrinsic and Extrinsic semiconductors – Hall effect in semiconductor– Zener diode –Tunnel diode - Backward diode - Breakdown voltage - Avalanche Breakdown.

Unit II: Transistors

Transistors - PNP and NPN transistors - DC Characteristics of CE and CB configuration-Hybrid parameters-Functions of Transistor as an amplifier and oscillator – FET - N-channel FET - Performance characteristics - FET amplifier

Unit III: Lasers

Laser and Maser - Basic concepts of stimulated emission – Spontaneous emission - Population inversion and Meta stable state-He-Ne laser-Ruby laser - Ammonia Maser - Production – Advantages.

Unit IV: Opto-Electronic Devices

LED Radiation transition - Emission spectra –Luminescent efficiency-Method of Excitation-Visible LED-Materials for LED - LED configuration and performance - Photo conduction – Photo diode-Photo transistor- Electronic watches- Seven segment display -LCD.

Unit V: Operational Amplifier

The basic operational amplifier– Inverting and non- inverting operational Amplifier – Differential operational amplifier – CMRR-Basic uses of operational amplifier as sign and scale changer and phase shifter - Adder – Subtractor – Comparator - Differentiator .

Book for study:

1. Theraja B.L., The fundamentals of solid state physics, Sultan Chand& Co., Delhi, 2002 (Unit I).
2. Ramaswami.V, Engineering Physics, D.Prentice Hall of India, New Delhi, 1953(Unit III).

3. V.K.Metha,RohitMetha,Basic Electronics,S. Chand& Co., New Delhi,2015
(Unit II, IV &V).

References

1. Jacob Millman, Micorelectronics, McGraw Hill publications, New Delhi, 1985.
2. Mithal G.K. and Vanvasi, Pulse and Digital electronics, Khanna publication, New Delhi, 2006.
3. Ramanan,Function Electronics, TMH, New Delhi, 1994.
4. Millman&Halkias, Electronics Devices and Circuits, McGraw-Hill, 1967.

Relationship Matrix for course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
I	20UPH4AC6		APPLIED PHYSICS-III			4			4	
Course Outcomes	Programme Outcomes					Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓		✓	✓	✓	✓		✓
CO3	✓		✓	✓	✓	✓		✓	✓	
CO4	✓	✓		✓		✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches(✓) =43 , Relationship: High										

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relatioship	Very Poor	Poor	Moderate	High	Very High

Prepared By **Checked By** **HOD**