## B.Sc. Physics

| SEM | COURSE CODE | PART | COURSE | COURSE TITLE | Ins. Hrs. /Week | CREDIT | MARKS | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | CIA | ESE | |
| I | 20U1LT1/LA1/LF1/ LH1/LU1 | I | Language – I | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN1LE1 | II | English - I | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH1CC1 | III | Core – I | Properties of Matter and Acoustics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH1CC2P | | Core – II | Properties of Matter : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UCH1AC1:1 | | Allied –I | Inorganic, organic and Physical Chemistry -I | 5 | 4 | 25 | 75 | 100 |
| | 20UCH1AC2P | | Allied –II | Practical - I - Volumetric Estimations | 3 | 2 | 20 | 80 | 100 |
| | 20UCN1AE1 | IV | AEC-I | Value Education | 2 | 2 | - | 100 | 100 |
| | | | | **TOTAL** | **30** | **21** | | | **700** |
| II | 20U2LT2/LA2/LF2/ LH2/LU2 | I | Language – II | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN2LE2 | II | English – II | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH2CC3 | III | Core – III | Mechanics and Relativity | 6 | 5 | 25 | 75 | 100 |
| | 20UPH2CC4P | | Core – IV | Heat and Optics : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UCH2AC3:1 | | Allied – III | Inorganic, organic and Physical Chemistry –II | 4 | 3 | 25 | 75 | 100 |
| | 20UCH2AC4P | | Allied –IV | Practical -II - Organic Analysis | 3 | 2 | 20 | 80 | 100 |
| | 20UCN2SE1 | IV | Skill Enhancement Course - I @ | Soft Skills Development | 2 | 2 | - | 100 | 100 |
| | | | | **TOTAL** | **30** | **20** | | | **700** |
| III | 20U3LT3/LA3/LF3/ LH3/LU3 | I | Language– III | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN3LE3 | II | English – III | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH3CC5 | III | Core– V | Thermal Physics | 4 | 4 | 25 | 75 | 100 |
| | 20UPH3CC6P | | Core– VI | Thermal and Electricity : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UMA3AC5:2 | | Allied– V | Differential and Integral Calculus | 4 | 3 | 25 | 75 | 100 |
| | 20UMA3AC6:2 | | Allied–VI | Algebra and Trigonometry | 3 | 2 | 25 | 75 | 100 |
| | 20UPH3GE1 | IV | Generic Elective I # | | 2 | 2 | - | 100 | 100 |
| | 20UCN3AE2 | | AEC-II | Environmental Studies | 2 | 2 | - | 100 | 100 |
| | | | | **TOTAL** | **30** | **21** | | | **800** |
| IV | 20U4LT4/LA4/LF4/ LH4/LU4 | I | Language–IV | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN4LE4 | II | English– IV | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH4CC7 | III | Core– VII | Optics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH4CC8P | | Core - VIII | Measurement and Calibration : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UMA4AC7:2 | | Allied– VII | Differential Equations | 4 | 3 | 25 | 75 | 100 |
| | 20UMA4AC8:2 | | Allied–VIII | Vector Calculus and Fourier series | 4 | 2 | 25 | 75 | 100 |
| | 20UPH4GE2 | IV | Generic Elective – II # | | 2 | 2 | - | 100 | 100 |
| | 20UCN4EA | V | Extension Activities | NCC, NSS, etc. | - | 1 | - | - | - |
| | | | | **TOTAL** | **30** | **21** | | | **700** |
| V | 20UPH5CC9P1 | III | Core – IX | Optics and Numerical Programming : Practicals | 3 | 3 | 10 | 40 | 50 |
| | 20UPH5CC9P2 | | | Analog Electronics and Microprocessor:Practicals | 3 | 2 | 10 | 40 | 50 |
| | 20UPH5CC10 | | Core – X | Electricity, Magnetism and Electromagnetism | 5 | 5 | 25 | 75 | 100 |
| | 20UPH5CC11 | | Core – XI | Spectroscopy | 5 | 5 | 25 | 75 | 100 |
| | 20UPH5CC12 | | Core - XII | Atomic Physics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH5DE1A/B | | DSE-I ** | | 5 | 4 | 25 | 75 | 100 |
| | 20UPH5SE2A/B | IV | Skill Enhancement Course II @ | | 2 | 2 | -- | 100 | 100 |
| | 20UPH5SE3A/B | | Skill Enhancement Course III @ | | 2 | 2 | -- | 100 | 100 |
| | 20UPH5EC1 | | Extra Credit Course – I | General Intelligence for competitive examinations | **-** | **4*** | **--** | **100*** | **100** |
| | | | | **TOTAL** | **30** | **28** | | | **700** |
| VI | 20UPH6CC13P1 | III | Core– XIII | General Physics and Scientific Programming : Practicals | 3 | 3 | 10 | 40 | 50 |
| | 20UPH6CC13P2 | | | Digital Electronics and Microprocessor: Practicals | 3 | 3 | 10 | 40 | 50 |
| | 20UPH6CC14 | | Core– XIV | Wave Mechanics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH6CC15 | | Core - XV | Nuclear Physics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH6CC16 | | Core XVI | Laser and Medical Physics | 4 | 4 | 25 | 75 | 100 |
| | 20UPH6DE2A/B | | DSE II ** | | 5 | 4 | 25 | 75 | 100 |
| | 20UPH6DE3A/B | | DSE III ** | | 4 | 4 | 25 | 75 | 100 |
| | 20UCN6AE3 | IV | AEC-III | Gender Studies | 1 | 1 | - | 100 | 100 |
| | 20UPH6EC2 | | Extra Credit Course - II | Physics for Competitive Examination | **-** | **4*** | **--** | **100*** | **100** |
| | 20UPHAECA | | Extra Credit Course for all | Online Course | **-** | **1*** | **-** | **-** | **-** |
| | | | | **TOTAL** | **30** | **29** | | | **700** |
| | | | | **GRAND TOTAL** | **180** | **140** | **-** | **-** | **430** |

* Not Considered for Grant Total and CGPA

## @ Skill Enhancement Courses

| SEMESTER | COURSE CODE | COURSE TITLE |
|---|---|---|
| V | 20UPH5SE2A | Scientific programming in C |
| | 20UPH5SE2B | Programming in C++ |
| | 20UPH5SE3A | Electrical and Electronic Instrumentation |
| | 20UPH5SE3B | Electrical and Electronic Appliances |

## ** Discipline Specific Electives

| SEMESTER | COURSE CODE | COURSE TITLE |
|---|---|---|
| V | 20UPH5DE1A | Semiconductor Devices and Circuits |
| | 20UPH5DE1B | Fundamentals of Nanoscience |
| VI | 20UPH6DE2A | Digital Electronics and Microprocessor |
| | 20UPH6DE2B | Materials Science |
| | 20UPH6DE3A | Non Conventional Energy Physics |
| | 20UPH6DE3B | Astrophysics |

## # Generic Electives for other major departments

| Semester | CODE | Course Title |
|---|---|---|
| III | 20UPH3GE1 | Physics for Home Appliances |
| IV | 20UPH4GE2 | Medical Physics |

**Note: ##.....## Self study portion**

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| I | 20UPH1CC1 | CORE – I | PROPERTIES OF MATTER AND ACOUSTICS | 5 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. acquire the basic principle of properties of matter and the underlying concepts of bending behaviour of beams.

CO 2. learn the practical experiments and laboratory skills.

CO 3. familiarise with general terms in acoustics.

CO 4. understand the theory and practical applications of elasticity in their day to day life.

CO 5. learn the fundamental ideas for pursuing higher studies.

**Unit – I: Elasticity (15 Hours)**

Types of elasticity – Relation between Elastic modulii– Poisson's ratio – relation between Poisson's ratio and Elastic modulii – Experimental determination of Poisson's ratio of rubber - Expression for torque per unit twist- Rigidity Modulus by Torsion pendulum-Bending moment of a beam – Theory of Young's modulus: Uniform bending and non-uniform bending.

**Unit – II: Viscosity and Surface Tension (15 Hours)**

Coefficient of viscosity – streamline and turbulent flow - Poiseuille's equation for the coefficient of viscosity - corrections in the Poiseuille's equation - viscosity of gases – Meyer's modifications of Poiseuille's Formula

Surface tension- molecular theory- pressure difference across a spherical surface – excess pressure inside a curved surface – Jaeger's experiment to determine the surface tension of a liquid.

**Unit –III: Diffusion and Osmosis (15 Hours)**

Diffusion of liquids – Graham's laws of diffusion for liquids – Fick's law of diffusion – **#**Analogy between liquid diffusion and heat conduction## – Experimental determination of coefficient of diffusion.

Osmosis and Osmotic pressure – Laws of Osmotic pressure -Experimental determination of osmotic pressure (Berkeley and Hartley method) — **#**elevation of the boiling point**#** – depression of freezing point.

**UNIT – IV Velocity of Sound (15 hours)**

Origin of sound - velocity of longitudinal waves in gases – Newton's formula for velocity of sound in air - effect of temperature - pressure – density of the medium, humidity, wind – velocity of sound in water (experiment) — wave velocity and molecular velocity – Doppler effect – observer at rest and source in motion – **#s**ource at rest and observer in motion**#** – when both the source and the observer are in motion.

**UNIT – V Fundamentals of Acoustics (15 hours)**

Introduction and terminology - wave equation - Transmission Line equations – one dimensional waves - Acoustics – Reverberation – Reverberation time - Sabine's reverberation formula — Factors affecting the acoustics of the buildings- Conditions for good acoustics – Ultrasonics- Properties- Production of ultrasonic waves – Piezo electric oscillator – **#**Applications of ultrasonic waves**#**.

**#.....# self-study portion**

**Text Books:**

1. R. Murugeshan, Properties of Matter, Fifth Edition, S. Chand & Co Pvt. Ltd., New Delhi. 1994, Reprint 2010.
   Unit – I: Section 1.1-1.2, 1.7 - 1.8, 1.9, 1.13, 1.14, 1.15, 1.19, 1.20
   Unit – II: Section 2.1-2.4, 2.13,3.1,3.2,3.8,3.9,3.11
   Unit – III: Section 3.1 – 3.4, 3.6, 3.8 – 3.9, 3.11, 3.12 (Chapter III)
2. N.Subrahmanyam, Brijlal, Waves and Oscillations ,Vikas Publishing House Pvt, Ltd. Second Revised Edition, 1994.
   Unit – IV: Section 5.1, 5.3-5.10, 5.13, 9.1-9.4
   Unit – V: Section 11.14 – 11.16, 11.20 – 11.24, 11.27

**Books for Reference:**

1. Mathur D.S., Elements of Properties of Matter, Eleventh Edition, Shyam Lal Charitable Trust, New Delhi, 1993

**Web References:**

1. www.physicstutoruials.org
2. www.sciencelearn.org.nz
3. https://classcentral.com/course/swayam_fundamentals-of-acoustics_7927
   Indian Institutes of Technology Kanpur and NPTEL via Swayam.

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

| **Semester I** | **Code 20UPH1CC1** | | **Title of the Course PROPERTIES OF MATTER AND ACOUSTICS** | | | | | | **Hours 5** | **Credits 5** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ |
| **CO2** | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ |
| **CO3** | ✔ | | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| **CO4** | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | ✔ | |
| **CO5** | ✔ | ✔ | | ✔ | | | | | ✔ | |
| Number of matches = 36, Relationship : High | | | | | | | | | | |

Prepared by :
Mr. A. Abbas Manthiri

Checked by :
Mr. J. Umar Malik

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| I | 20UPH1CC2P | CORE – II | PROPERTIES OF MATTER – PRACTICAL | 3 | 2 | 100 | 20 | 80 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. acquire the basic principles of properties of matter and underlying the concepts of bending behaviour beams.

CO 2. learn the practical skills essential for experimentation.

CO 3. familiarise themselves the concept of heat, optics and acoustics.

CO 4. understand the theory and practical applications of properties of matter and electronics in their day to daylife.

CO 5. acquir the basic concepts required for their higher studies.

**List of Experiments:**

1. Determination of the Young's Modulus [Y] of a material using non-uniform Bending Method (Pin & Microscope).
2. Determination of Surface Tension [T] by Capillary Rise Method.
3. Determination of the Co-efficient of viscosity [η] of a Liquid by Burette Method
4. Thermal conductivity of a bad conductor using Lee's Disc.
5. Verification of Laws of Transverse Vibrations [I & II laws] in a stretched string using a sonometer.
6. Determination of the Refractive Index [μ] of glass using a prism and a spectrometer.
7. Determination of Resistance and Specific Resistance [R &ρ] using a Meter Bridge.
8. Construct the basic logic (AND,OR, NOT) gates using discrete components.
9. **#Determination of the frequency of the vibrator using Melde's apparatus.**
10. Determination of the temperature coefficient of resistance of the material using post office box.

**# - New experiment introduced under DBT Star College scheme**

**Books for Reference:**

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

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

**Web References:**

www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester I** | **Code 20UPH1CC2P** | | | **Title of the Course PROPERTIES OF MATTER – PRACTICALS** | | | | **Hours** 3 | | **Credits 2** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ |
| CO4 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ |
| Number of matches = 36 (ie.) 72 %, Relationship - High | | | | | | | | | | |

Prepared by

Dr. Shek Dhavud

Checked by

Dr. C. Hariharan

Note:

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

# SEMESTER - II

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| II | 20UPH2CC3 | CORE – III | MECHANICS AND RELATIVITY | 6 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. Assimilate the theoretical knowledge and principle of mechanics which enable the student to become self-reliant on learning advanced level leanings

CO 2. Know the concept of mechanics enhanced the laboratory skills and problem solving ability in relevant area and induce the inquisitiveness.

CO 3. Lead to better understanding of the subjects in higher studies by knowing limitation and applications of mechanics

CO 4. Obtain sound knowledge in Mechanics which provide self-confidence and in turn encourage to enter into self-jobs in area concerneds

CO 5. behave in a matured way and become more Ethical

**Unit-I: Impact of Elastic Bodies and Motion of Projectile (18 Hours)**

**Impulse and Impact:** Impulse of a force –collision –elastic and inelastic collision –laws of impact – direct impact of two smooth spheres –loss of kinetic energy due to direct impact –oblique impact of two smooth spheres –loss of kinetic energy due to oblique impact

**Projectile motion:** theory of projectile motion-range, maximum height, time of flight of the projectile particle- motion of a projectile particle down an inclined plane —two body problem – reduced mass

**Unit II: Dynamics of Rigid Bodies and Friction (18 Hours)**

Moment of inertia –radius of gyration –perpendicular axes theorem –parallel axes theorem –moment of inertia of a thin circular ring, triangular lamina and uniform rod –theory of compound pendulum – period of oscillation of a compound pendulum

**Friction**: Definition –static, dynamic, rolling and limiting friction and laws of friction

**Unit III: Centre of Gravity, Centre of Pressure and Hydrodynamics (18 Hours)**

**Centre of Gravity:** Definition - centre of gravity of a solid cone, solid hemisphere, hollow hemisphere

**Centre of Pressure:** Definition – centre of pressure of a vertical rectangular lamina, vertical triangular lamina

**Hydrodynamics:** Euler's equation for unidirectional fluid flow –Bernoulli's theorem –venturimeter

**Unit IV: Newtonian Mechanics (18 Hours)**

Centre of mass –Definition – centre of mass of a two particle system –conservation of linear and angular momenta of a particle - basic ideas of degrees of freedom - generalized co-ordinates and generalized momentum.

Rocket motion –Principle –theory –escape velocity –propulsion system –multistage rocket –shape of the rocket.

**Unit V:Relativity (18 Hours)**

Concepts of space, time and mass –frames of reference –Newtonian principle of relativity –Galilean transformation equations –Ether hypothesis – Michelson-Morley experiment –postulates of the Special theory of relativity–Lorentz transformation –length contraction –time dilation – postulates of the general theory of relativity.

**Text Books:**

1. R Murugesan, Mechanics and Mathematical Physics, Third Edition, S. Chand Publications
   Unit 1: Section 1.1- 2.4
   Unit III: Section 3.1, 3.2, 3.4, 3.5, 3.6, 4.3, 4.4, 4.5, 5.3, 5.4
   Unit IV: Section 19.1, 23.1-23.3, 23.11, 13.8-13.13
2. R Murugeshan, Properties of Matter, Revised Edition, S Chand Publications
   Unit II: Section 7.1-7.4, 10.1, 10.2, 22.1-22.3
3. R Murugeshan, Modern Physics, 18th Edition, S.Chand Publications
   Unit V: Section 1.1-1.10, 1.16

**Books for Reference**

1. S L Kakani., C Hermrajam., ShubhraKakani., Mechanics, Ist Edition, Viva Books Private Limited, Reprinited 2009
2. Brijlal., N Subramanyam., Mechanics and Electrodynamics, Jivan Seshan,. S. Chand publication, Reprint 2008
3. H S Hans and S P Puri., Mechanics, Tata McGraw Hill Publishing Company Limited, Seventh Reprint 2009
4. Daniel Kleppner, Robert Kolenkow., An Introduction to Mechanics, Tata McGraw Hill publishing Company limited, 23rd reprint 2017
5. Isaac Newton., The Principia (Mathematical principles of natural philosophy), Snowball publishing company, 2010

**Web References:**

1. https://www.khanacademy.org/science/ap-physics-1/ap-linear-momentum/inelastic-collisions-and-2d-collisions-ap/v/elastic-and-inelastic-collisions
2. https://www.khanacademy.org/science/ap-physics-1/ap-linear-momentum/center-of-mass-ap/v/center-of-mass
3. https://www.khanacademy.org/science/physics/special-relativity/einstein-velocity-addition/v/time-dilation
4. https://www.youtube.com/watch?v=oK8UxWI-85Y
5. https://www.khanacademy.org/science/physics/forces-newtons-laws/inclined-planes-friction/v/static-and-kinetic-friction-example

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

| Semester II | Code 20UPH2CC3 | | Title of the Course MECHANICS AND RELATIVITY | | | | | Hours 6 | Credits 5 |
|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| CO3 | | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| CO4 | | | ✓ | ✓ | ✓ | | | | ✓ | ✓ |
| CO5 | | | | | ✓ | | | | | ✓ |
| Number of matches (√) = 30 (ie.) 60 %, Relationship: Moderate | | | | | | | | | | |

Prepared by:
Mr. J. Umar Malik

Checked by:
Mr. A. Abbas Manthri

**Note:**

| Mapping | 1–29% | 30–59% | 60–69% | 70–89% | 90–100% |
|---|---|---|---|---|---|

| Matches | 1-14 | 15-29 | 30-34 | 35-44 | 45-50 |
|---|---|---|---|---|---|
| Relationship | Very Poor | Poor | Moderate | High | Very High |

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| **II** | **20UPH2CC4P** | **CORE – IV** | **HEAT AND OPTICS - PRACTICAL** | **3** | **2** | **100** | **20** | **80** |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. acquire the basic principles of properties of matter and underlying the concept of bending behaviour beams.

CO 2. learn the practical skills necessary for experimentation.

CO 3. familiarise the concepts of heat, optics and acoustics and understood the measurements of some physical quantities through heat and optical experiments

CO 4. understand the characteristics of the semiconductor diodes and practical applications of properties of matter and optics in their day to day life.

CO 5. acquire the basic concepts for their higher studies.

**List of Experiments:**

1. Determination of the Young's modulus [Y] of a material using Non-uniform bending (Scale&Telescope).
2. Static Torsion: Determination of the Rigidity Modulus [N] of a material.
3. Compound Pendulum: Determination of the Acceleration due to Gravity and Radius of Gyration [g & K].
4. Comparison of the co-efficient of viscosities of two liquids using the Burette method.
5. Determination of the Specific heat capacity [S] of a liquid using Newton's Law of Cooling.
6. Determination of the specific gravity of a solid and liquid using a sonometer.
7. Air wedge: Determination of the thickness of a material by forming interference fringes.
8. Characteristics of a PN Junction Diode and a Zener Diode.
9. **# Measurement of Dielectric constant for solids and liquids using LCR Meter**
10. Determination of radii of curvature of convex and concave lenses.

**# - New experiment introduced under DBT Star College scheme**

**Books for reference:**


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

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


**Web References:**

www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester II** | **Code 20UPH2CC4P** | | **Title of the Course HEAT AND OPTICS - PRACTICALS** | | | | | | **Hours 3** | **Credits 2** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| CO2 | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | |
| CO4 | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ | |
| CO5 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Number of matches (√) = 34 (ie.) 68 %, Relationship : Moderate | | | | | | | | | | |

Prepared by

Dr. S. Abbas Manthiri

Checked by

Dr. S. Shek Dhavud

Note:

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

(ALLIED – FOR CHEMISTRY & MATHS)

# SEMESTER – I

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| I | 20UPH1AC1 | ALLIED - I | FUNDAMENTALS OF PHYSICS | 5 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. the understand the basic principles of certain physical properties of the materials around us

CO 2. the ability to compare different constants of different materials

CO 3 . the ability to analyze viscosity, surface tension, diffusion, osmosis, properties of liquid

CO 4. learn to measure centre of gravity of objects

CO 5. enhance their talents to analyze the physical properties of new materials

**UNIT – I** **(15 hours )**

**Elasticity:** Stress and strain – Hooke's law –types of elastic constants – Young's modulus, Rigidity modulus & Bulk modulus –Poisson's ratio –determination of Young's modulus by non-uniform bending (Pin and Microscope) - surface tension:- definition –molecular theory- determination of surface tension by Jaeger's method.

**Viscosity:** co-efficient of viscosity –determination of co-efficient of viscosity by burette method – **##**comparison of viscosities**##**

**UNIT – II** **(15 hours)**

**Mechanics:** Newton's law of gravitation –Kepler's laws of planetary motion–gravitation contstant G-determination of G by Boy's method- friction- laws of friction – centre of gravity - - time period of compound pendulum - centre of gravity of a solid hemisphere – meta center – meta centric height – **##**determination of the metacentric height of a ship**##**.

**UNIT – III** **(15hour)**

**Sound:** Simple harmonic motion (SHM) –equation of simple harmonic motion – composition of two SHM's in a straight line – composition of two SHM's at right angles to each other –Lissajou's figures (Basic concept only) –ultrasonic – properties – production by piezo-electric method-**##**applications of ultrasonics**##**– reverberation and reverberation time-conditions for a good auditorium.

**UNIT – IV** **(15 hours)**

**Heat:** Newton's law of cooling -determination of specific heat capacity of a liquid by cooling – thermal conductivity – co-efficient of thermal conductivity – determination of thermal conductivity of a bad conductor by lee's disc method – solar constant – **##** determination of solar constant by Angstrom's Pyrheliometer**##**-temperature of the sun-Joule-Kelvin effect- porus plug experiment.

**UNIT – V** **(15 hours)**

**Diffusion:** Diffusion of liquids – graham's laws of diffusion in liquids –ficks' law of diffusion – analogy between liquid diffusion and heat conduction – experimental determination of coefficient of diffusion.

**Osmosis:** osmosis and osmotic pressure – laws of osmotic pressure -experimental determination of osmotic pressure (Berkeley and Hartley method)

**Text Books:**

**T.B 1** R. Murugesan, Properties of matter, S.Chand& Co, 5th Edition, 2007
**T.B 2** R. Murugesan, Properties of matter, S.Chand& Co, 4th Edition, 2005
**T.B 3** Brijlal&Subramaniam, Heat & thermodynamics, S.Chand Publications, 7th Edition, 2008**.**

| | | |
|---|---|---|
| Unit – I: | 1.1 - 2.11 | T.B 1 |
| Unit – II: | 6.1-6.3, 6.10, 18.1-18.4,20.1-20.3&22.1-22 | T.B 2 |
| Unit – III: | 11.1 - 11.17 | T.B 1 |
| Unit – IV: | 4.1- 5.5 | T.B 3 |
| Unit – V: | 2.21, 8.1- 8.28 | T.B 2 |

**Books for Reference:**


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


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

| **Semester I** | **Code 20UPH1AC1** | | **Title of the Course FUNDAMENTALS OF PHYSICS** | | | | | **Hours 5** | **Credits 4** |
|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| CO2 | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | | |
| CO3 | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | |
| CO4 | ✓ | | | ✓ | | | ✓ | ✓ | ✓ | |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Number of matches (√) = 36 (ie.) 72 %, Relationship : High | | | | | | | | | | |

Prepared by:
Ms. R.Gowthar

Checked by:
Dr. A. S. Haja Hameed

Note:

| Mapping | 1–29% | 30–59% | 60–69% | 70–89% | 90–100% |
|---|---|---|---|---|---|
| Matches | 1-14 | 15-29 | 30-34 | 35-44 | 45-50 |

| Relationship | Very Poor | Poor | Moderate | High | Very High |
|---|---|---|---|---|---|

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| I | 20UPH1AC2P | ALLIED -II | PROPERTIES OF MATTER – PRACTICAL | 3 | 2 | 100 | 20 | 80 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. acquire the basic principles of properties of matter and underlying the concept of Bending behaviour beams.

CO 2. learn the practical skills necessary for experimentation

CO 3. familiarise the concepts of heat, optics and electronics and understood the experimental skills and determination of the physical coefficients of matters

CO 4. understand the theory and practical applications of properties of matter and electronics in their day to day life.

CO 5. acquire the basic requirements for their higher studies.

**List of Experiments:**

1. Young's Modulus – Non Uniform bending (Scale &Telesscope)
2. Surface Tension – Capillary Rise Method.
3. Potentiometer – Low range Voltmeter calibration
4. Specific heat capacity of a liquid – Newton's law of cooling.
5. Air wedge – Thickness of a thin wire.
6. Co-efficient of viscosity – Burette method.
7. Spectrometer Solid Prism - μ
8. Basic logic gates using discrete components.

**Books for reference:**


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

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

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

| **Semester I** | **Code 20UPH1AC2P** | | **Title of the Course PROPERTIES OF MATTER – PRACTICALS** | | | | **Hours 3** | | **Credits 2** |
|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | |
| CO3 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | |
| CO4 | ✓ | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Number of matches (√) = 35 (ie.) 70 %, Relationship : High | | | | | | | | | | |

Prepared by
Dr. C. Hariharan

Checked by
Dr. A.S. Haja Hameed

Note:

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

# SEMESTER – II

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| II | 20UPH2AC3 | ALLIED–III | ESSENTIALS OF PHYSICS | 4 | 3 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. the understand the basic principles and contempory concepts on various fields on physics like Atomic and Nuclear physics.

CO2. develop their skills to handle the electronic components in their day to day life .

CO 3. enhance their knowledge to handle the optical instruments.

CO 4. structure themselves to construct circuit using current carrying components.

CO 5 understand the basic requirements for their higher studies

**UNIT – I** **(12 hours)**

**Optics:** Velocity of light – Michelson's method – Interference – **#**Types of interference**#** -Thickness of a thin wire using by air wedge (Theory and Experiment) -– Measurement radius of curvature with Newton's rings – Diffraction – Fresnel's explanation of rectilinear propagation of light - optical activity – Biot's laws - Specific rotatory Power- Laurent's half shade Polari meter.

**UNIT – II** **(12 hours)**

**Electricity:** Coulomb's law – Gauss law statement and proof - Principle of capacitor –Energy stored in a charged capacitor – Loss of energy due to sharing of charges.

Kirchoff's law – Wheatstone bridge - Carey foster's bridge – Determination of specific resistance – Potentiometer - Calibration of low range voltmeter and ammeter using Potentiometer.

**UNIT – III** **(12 hours)**

**Atomic & Nuclear properties:** Vector atom model – **#**Quantum numbers**#** – L-S coupling – J-J coupling - Pauli's Exclusion Principle – Zeeman Effect – Experimental arrangement for normal Zeeman effect

Liquid drop model - Construction and working of an Ionization chamber- Construction and working of G.M Counter - Nuclear fission - Energy released in fission –Nuclear fusion - Carbon- Nitrogen cycle

**UNIT – IV** **(12 hours)**

**Spectroscopy:** UV Spectrum- Range- UV Spectroscopy-Instrumentation-Applications-IR Spectrum-Range - IR Spectroscopy-Instrumentation - **#**Applications**#** - Raman effect- Characteristics of Raman lines - Stokes and anti-stokes lines-Experimental set up of Raman Spectroscopy

**UNIT – V** **(12 hours)**

**Electronics :** Semiconductors-Types of Semiconductors – P-N Junction Diode and Zener diode - *V-I* Characteristics of PN Junction and Zener diodes- Conversion between Binary, Decimal and Hexadecimal number systems - AND, OR, NOT gates using discrete components– De-Morgan's theorems – NAND and NOR as universal gates

**#.....# Self study portion**

**Text Books:**

**T.B 1** R. Murugesan, Allied Physics Paper I & II , S. Chand & Co, Fifth revised edition, New Delhi, 2005.

**T.B.2** R.Murugeshan, Electricity and Magnetism –S.Chand & company, Seventh Revised Edition 2008

**T.B 3** R.Murugeshan and Kiruthiga Sivaprasath, Modern Physics, S.Chand & Co, Sixteenth edition, New Delhi, 2012.

**T.B.4** R. Murugeshan, Optics and Spectroscopy. Second Edition,S. Chand and Co. New Delhi

| | | |
|---|---|---|
| Unit I | 6.1,6.2, 6.5,6.8,6.9, 6.17 – 6.20 | T.B 1 |
| Unit II | 1.1 – 1.5, 2.1, 2.2, 2.5, 2.8, 2.11,2.12, 4.1 – 4.9, 4.11 | T.B 2 |
| Unit III | 27.10, 29.3, 29.6, 35.2, 35.3, 35.7, 35.8 | T.B 3 |
| Unit IV | 24.5, 24.6, 24.9, 24.10 | T.B 3 |
| Unit IV | 5.5,5.6,5.7 | T.B.4 |
| Unit V | 55.1 – 55.3, 58.1 - 58.5, 70.1- 70.4, 7.11, 70.21 | T.B 3 |

**Book for Reference:**

Arthur Beiser, Concepts of Modern Physics, McGraw Hill, Fifth edition, 1999.

**Web Reference:**

https://www.classcentral.com/course/edx-electricity-and-magnetism-part-1-3032

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

https://www.nuclear-power.net/nuclear-power/reactor-physics/atomic-nuclear-physics/

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

| **Semester II** | **Code 20UPH2AC3** | | **Title of the Course ESSENTIALS OF PHYSICS** | | | | | | **Hours 4** | **Credits 3** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| CO5 | | | | ✓ | | ✓ | | | ✓ | |
| Number of matches (√) = 36 (ie.) 72 %, Relationship : High | | | | | | | | | | |

Prepared by: Checked by:

Mrs. G.PRAGADEESWARI Mr. A. ABBAS MANTHIRI

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| II | 20UPH2AC4P | ALLIED–IV | OPTICAL, THERMAL AND ELECTRICITY - PRACTICAL | 3 | 2 | 100 | 20 | 80 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1. acquire the basic principles of properties of matter and underlying the concept of bending behaviour beams.

CO 2. learn the practical the experimental skills and demonstrate laboratory skills.

CO 3. familiarize the concept of heat, optics and electronics .Understood the characteristics of the semiconductor diodes

CO 4. understand the theory and practical applications of properties of matter and electronics in their day to day life and learnt the circuit construction in the electricity and electronics experiments

CO 5. acquire the basic concepts required for their higher studies.

**List of Experiments:**

1. Young's modulus - Non Uniform bending.(Pin & Microscope)
2. Potentiometer – Ammeter calibration.
3. Compound Pendulum: Determination of the Acceleration due to Gravity and Radius of Gyration [g & K].
4. Meter Bridge – R & $\rho$.
5. Sonometer – Verification of transverse laws of vibration (I & II Law)
6. Newton's rings – Radius of curvature.
7. Spectrometer – Grating by normal incidence method
8. Zener Controlled bridge rectifier.

**Books for Reference:**


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

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

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

| **Semester II** | **Code 20UPH2AC4P** | | **Title of the Course OPTICAL, THERMAL AND ELECTRICITY - PRACTICALS** | | | | | **Hours 3** | **Credits 2** |
|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| CO2 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | |
| CO3 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | |
| CO4 | ✓ | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ |
| CO5 | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Number of matches (√)35 (ie.) 70 %,, Relationship : High | | | | | | | | | | |

Prepared by

Dr. C. Hariharan

Checked by

Dr. A.S. Haja Hameed

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| III | 20UPH3CC5 | CORE – V | THERMAL PHYSICS | 4 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. acquire the basic principles of heat energy , heat conduction and their properties.
2. Obtain the capacity of solving problems related to thermal conductivity and entropies.
3. Imbibe the ability to understand the laws of radiation and its visualization in day to day life.
4. explore the ideas of lowering the temperature.
5. be motivated to carryout research in Heat and Thermodynamics related fields.

**Unit-I : Kinetic theory of Heat (15Hours)**

Fundamental assumptions of Kinetic theory of heat-Pressure of a gas-Relation between pressure and Kinetic energy -**#**Mean free path**#**-Two specific heat capacities of gases- Mayer's relation-Determination of specific heat capacity at constant volume by Joule's method.- Problems.

**Unit-II :Radiation and Transmission of Heat (15 Hours)**

Conduction process-Thermal conductivity-Measurement of thermal conductivity by Forbe's method – Lee Disc method - Thermal radiation-Derivation of Planck's radiation law-**#**Stefan's law**#**-Newton's law from Stefan's law- Experimental determination of Stefan's constant.

**Unit-III :Specific Heat (15 Hours)**

Specific heat capacity of liquids-**#**Dulong and Pettit's law**#**- Variation of specific heat and atomic heat with temperature - Newton's law of cooling-Specific heat capacity of liquids-Barton's correction- Debye's theory of Specific heat capacity of solids.

**Unit-IV :Thermodynamics (15 Hours)**

Statements of Zeroth, first, second and third laws of thermo dynamics - Isothermal and adiabatic processes -Work done during isothermal and adiabatic changes - Carnot's theorem-Entropy-Principle of increase of entropy – Change of entropy in irreversible process- **#**Change of entropy problems**#**

**Unit-V :Low temperature physics (15Hours)**

Joule-Thomson effect – Porous plug experiment – Joule-Thomson cooling produced in a van der Waals gas-Liquification of gases – Regenerative cooling – Liquification of air – Linde's process – Liquification of Helium -Practical applications of low temperature – Refrigeration-Carnot's cycle as refrigerator - Frigidaire – **#**Air conditioning**#**.

**# Self Study Portions #**

**Text Books:**

| Units | Title of the Book | Chapter |
|---|---|---|
| Unit – I | Heat and Thermodynamics - Brijlal and N. Subramaniam, P.S.Hemne. S. Chand & Co, New Delhi . Revised Edition. 2010 | 1.3,1.25,3.1,3.2,4.9, 14.10-14.11 |
| Unit – II | | 15.1,15.2,15.9-15.11, 8.1,8.2, 8.20-8.22 |
| Unit – III | | 14.1,14.17-14.19,14.5 |
| Unit – IV | | 4.2,4.6,4.7.4.28,4.29,4.10.3-4.14, 4.21-4.25,4.29,5.2-5.6 |
| Unit – V | Thermal physics -R. Murugeshan,Kiruthiga Sivaprasath. S.chand&co. Third Revised edition-2012. | 3.1-3.7,3.10,3.13,3.14, 3.16,3.17 |

**Books for Reference:**

1. Heat and Thermodynamics - J.B. Rajam and C. L. Arora, Second edition.S. Chand & Co, New Delhi.
   Thermodynamics and Statistical Physics - Sharma and Sarkar, Himalaya publishers, Mumbai.
2. Thermal Physics - R. Murugeshan, Kiruthiga Sivaprasath, II Edition, S.Chand& Co.

**Web References:**

1. https://study.com/academy/lesson/introduction-to-thermal-physics.html#:~:text=Lesson%20Summary-,Thermal%20physics%20is%20the%20study%20of%20heat.,the%20molecules%20in%20a%20substance.

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

| Semester III | Code 20UPH3CC5 | | Title of the Course THERMAL PHYSICS | | | | | Hours 4 | Credits 4 |
|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| CO2 | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| CO4 | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ | |
| CO5 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Number of matches (√) = 37 (ie.) 74 %, Relationship : High | | | | | | | | | | |

Prepared by
1. F.S.MUZAMMIL

Checked by :
1. R. GOWTHER

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| III | 20UPH3GE1 | Generic Elective – I | PHYSICS FOR HOME APPLIANCES | 2 | 2 | 100 | - | 100 |

**Course Outcomes:**

At the end of this course, students will be able to

1. acquire knowledge about the fundamental principles and classification of electrical appliances.
2. attain the ability to analyze and test various electrical home appliances.
3. understand the efficiencies of various electrical home appliances.
4. analyze different working mechanism of home appliances.
5. be capable of trouble shooting the varieties of problems and issues in electric home appliances.

**UNIT- I : Basics of Electricity and Lighting Systems (6 Hours)**

Definition-Voltage-Current-Resistance-Power-AC and DC currents-Ohm's Law- Power and Energy-Voltage drop-Calculation of electrical energy-The kilowattHour(kWh).

Incandescent lamp-Fluorescent lamp-Energy saving lamps: Compact Fluorescent Lamp-Types-Limitations of CFL-#LED Lamp#-Advantages.

**UNIT- II : Electric Iron Box & Electric Fan (6 Hours)**

Electric Iron BoxTypes – Non-Automatic – Automatic – Construction and Working – Comparision – Trouble Shooting – Steam Iron Box.

Electric Fan – Function – # Terminology # – Construction and Working of Ceiling & table fans– Exhaust Fan – General Fault and trouble shooting.

**UNIT- III : Water Heaters (6 Hours)**

Water Heater – Function – Types – Electric Kettle – Immersion water heater –Constructionand working – storage water heaters – Non pressure type – pressure type – construction and working– repairs & remedies – # Solar water heater #

**UNIT- IV : Electric Mixer & Centrifugal Pump (6 Hours)**

#Electric Mixer# – Function – Construction – General Operating Instruction – Caution – Cleaning– Repairs and Remedies

Introduction – Constructional features – working – friction lead – static suction head – staticdelivery lead –automatic operation of pump – Trouble shooting.

**UNIT- V : Vacuum Cleaner and washing machine (6 Hours)**

Vacuum Cleaner – Function – Principle – Main components – features – types - working – accessories - Filters – Repairing.

Washing Machine – Function – Types – Semi and Fully Automatic – Top and Front loading –washing technique – working cycle – construction and working of washing machine – # comparisonof Top and front loading machines # – Problems and Trouble shooting.

**# Self Study Portions #**

**Text Books:**

1. Service Manual-Electrical Home Appliances-GT Publications

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

| Semester III | Code 20UPH3GE1 | Title of the Course PHYSICS FOR HOME APPLIANCES | | | | | | | Hours 2 | Credits 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ |
| CO2 | | ✓ | | ✓ | | ✓ | | ✓ | ✓ | |
| CO3 | ✓ | | ✓ | | | ✓ | ✓ | ✓ | | ✓ |
| CO4 | | ✓ | | ✓ | ✓ | | | | ✓ | |
| CO5 | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Number of matches (√) = 32 (ie.) 64 %, Relationship : Moderate | | | | | | | | | | |

Prepared by :

Mr. Mohamed Ibrahim Sulaiman Sait

Checked by :

Mr. A. Mohamed Saleem

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| III | 20UPH3CC6P | CORE-VI | THERMAL AND ELECTRICITY - PRACTICAL | 3 | 2 | 100 | 20 | 80 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Acquire the basic principles of properties of matter and the underlying concepts of bending behavior of beams.
2. Learn the experimental skills.
3. Understand the measurements of some physical quantities through electrical and magnetism experiments
4. Understand the characteristics of the semiconductor diodes and the practical applications of properties of matter and electronics in their day to day life.
5. Acquire the basic requirements for their higher studies and learned the circuit construction in the electricity and electronics experiments .

**List of Experiments:**

1. Determination of the Young's modulus [Y] of a material using Uniform bending (Single Optic Lever).
2. Determination of the Co-efficient of viscosity [η] of a highly viscous liquid using Stoke's Method.
3. Measurement of the charge of an electron by Millikan's oil drop method.
4. Construction of AND, OR, NOT and EX-OR gates using NAND.
5. Measurement of specific charge of an electron ( e/m ratio ) by Thomson's method.
6. Figure of merit of a Sensitive Galvanometer.
7. Potentiometer: Calibration of a Low Range Voltmeter.
8. Bridge rectifier with π-section filter and Zener diodes.
9. Determination of magneto resistance of a semiconductors.
10. Construction of clipping and clamping circuits.

**Books for Reference:**


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


**Web References:**

www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester III** | **Code 20UPH3CC6P** | | **Title of the Course THERMAL AND ELECTRICITY PRACTICALS** | | | | | | **Hours 3** | **Credits 2** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| CO3 | ✓ | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| CO5 | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | |
| Number of matches (✓) = 36 (ie.) 72 %, Relationship : High | | | | | | | | | | |

Prepared by :

Mr. Mohamed Ibrahim Sulaiman Sait

Checked by :

Mr. A. Mohamed Saleem

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| IV | 20UPH4CC7 | CORE – VII | OPTICS | 5 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Understand the various types of aberrations that can occur in the lenses and the limitations that arise in eyepieces because of them.
2. Realize the concept of dispersion, the means of calculating dispersive power, know the instruments to observe it and as an illustrative example its real world application in the explanation of the formation of rainbows
3. Comprehend the concepts of interference, the various applications of it.
4. Have a clear idea of the concept of diffraction, and its applications in optical instruments.
5. Understand the concept of polarization and realize its consequences in real world situations such as in finding the optical activity of substances and their rotatory power.

**Unit – I: Geometrical Optics (15 Hours)**

Aberrations- Spherical aberration in lenses –Defects in lenses - Methods of minimizing spherical aberration - Condition for minimum spherical aberration of two thin lenses separated by a distance - Chromatic aberration in lenses - Condition for achromatism of two thin lenses (in contact and out of contact) - coma - astigmatism - #Ramsden and Huygen's eyepieces#- Comparison of eyepieces.

**Unit – II: Dispersion (15 Hours)**

Dispersion produced by a prism-Angular dispersion-Dispersive power-Cauchy's formula-Achromatism in prisms-Deviation without dispersion-Dispersion without deviation-Direct vision spectroscope-Constant deviation spectroscope-**#**Rainbow-Theory of primary Rainbow and secondary Rainbow**#**.

**Unit – III: Interference (15Hours)**

Theory of Interference fringes- Fresnel's Biprism: Experiment to determine the Wavelength of light-#Air wedge#- Determination of the diameter of a thin wire- Newton's Rings – Determination of wavelength of sodium light-Determination of refractive index of a liquid- Interferometer-Michelson's Interferometer- Construction-Working- Measurement of Wavelength of monochromatic light

**Unit – IV: Diffraction (15 Hours)**

Fresnel diffraction-Diffraction at circular aperture, straight edge and Narrow slit-Fraunhoffer diffraction-single slit-Double slit-Plane diffraction grating-theory and experiment to determine wavelength-**#**Absent spectra with a diffraction grating**#**-Dispersive power of a grating-Determination of wavelength of light using grating (Normal Incidence)- Rayleigh's criterion for Resolution-Resolving power of a prism.

**Unit – V: Polarization (15 Hours)**

Double refraction-Nicol prism-Polarizer and analyzer-Huygen's theory of double refraction in uniaxial crystals – Fresnel's theory of double refraction - Theory of Plane, Circularly and Elliptically polarized light- Quarter wave plate-Half wave plate- Production and detection of plane, circularly and elliptically polarized light **-** Optical activity-Specific rotation-**#**Laurent's half-shade polarimeter**#**.

**#**.....**#** **Self study portion**

**Text Books:**

1.R. Murugeshan and Kiruthiga Sivaprasath,Optics and Spectroscopy, S. Chand & Company Ltd, New Delhi , 7th Revised Edition, 2010.

| | | |
|---|---|---|
| UNIT I | Chapter 1 | Sections 1.16 – 1.28 |
| UNIT II | Chapter 1 | Sections 1.7– 1.13 & 24.1-24.3 |
| UNIT III | Chapter 2 | Sections 2.2 – 2.13 |
| UNIT IV | Chapter 3 | Sections 3.6 – 3.23 |
| UNIT V | Chapter 4 | Sections 4.5 – 4.20 |

**Books for Reference:**


1. Ajoy Ghatak,Optics, Tata Mc Graw Hill, New Delhi , 4th Edition, 2009.
2. Subrahmanyam, Brij Lal and M. N. Avadhanulu, A Text Book of Optics, S. Chand, New Delhi, 23rd Edition,2006


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

| **Semester IV** | **Code 20UPH4CC7** | | **Title of the Course OPTICS** | | | | | **Hours 5** | **Credits 5** |
|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Number of matches (√) = 45 (ie.) 90 %, Relationship : Very High | | | | | | | | | | |

Prepared by :

Dr. A. Ishaq Ahamed

Checked by :

Mrs. G. Pragadeeswari

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| **IV** | **20UPH4GE2** | **GENERIC ELECTIVE – II** | **MEDICAL PHYSICS** | **2** | **2** | **100** | **---** | **100** |

**Course Outcome:**

At the end of this course, students will be able to

1. Identify the symptoms related to the pressure in various parts of the body to be measured by medical indicators.
2. Understand the theory and construction of instrument intended for diagnosis and therapy.
3. Understand the basic concept of Laser and to apply newer technology to treat the diseases.
4. Learn the knowledge of ultrasound to detect the diseases.
5. Acquire a scientific awareness on the disease prevention and treatments.

**Unit – I: Pressure measurement** **(6 Hours)**

Eye pressure measurement – Schiotz Tonometer – Goldmann Tonometer – Comparison between Schiotz and Goldmann Tonometers – Urinary bladder pressure – Direct measurement – #Cathetar method#.

**Unit – II: Diagnostic Devices** **(6 Hours)**

X-ray machine – Comparison between radiography and fluoroscopy – #Angiography# Thermography: Theory and instrumentation – #MRI#: Theory and instrumentation.

**Unit – III: Therapeutic Devices** **(6 Hours)**

#Pace maker# – Comparison between external and internal pace maker – Defibrillators: Internal and external defibrillators – Different types of defibrillator: A.C. and D.C. defibrillator.

**Unit – IV: Laser in Medicine** **(6 Hours)**

Laser – Properties – Principle of Laser action: Spontaneous and Stimulated emission – Population inversion – Applications: #LASIK (Laser in-situ keratomileusis) Eye Surgery# – Advantages of Laser surgery – Laser blood cell counter.

**Unit – V: Ultrasonics in Medicine** **(6 Hours)**

#Ultrasonics# – Ultrasonic diathermy – Ultrasonic propagation through tissues – B-mode ultrascan – Applications of diagnostic ultrasound.

# **Self study** #

**Text Books:**

| Units | Title of the Book | Section Number | Page No. |
|---|---|---|---|
| Unit – I | **Medical Physics, John R. Cameron,** University of Wisconsin, Madison & James G. Skofronick, Florida State university, Tallahassee, A wiley-Interscience Publication, John Wiley & sons, Singapore. | 6.3, 6.4, 6.6 15.10 | 108 – 116, 374-383 |
| Unit – II | **Biomedical Instrumentation Dr. M. Arumugam** Second Edition, Reprint-2010, Anuradha Publications PVT, Kumbakonam, 2010. | 7.9, 7.10, 7.12, 10.8, 10.8.1, 10.10, 10.10.8 | 299–304, 306, 367–370, 390–391, 399 – 400 |
| Unit – III | | 5.2, 5.2.2, 5.5, 5.5.1(i,ii), 5.5.1 (a,b) | 164–167,185–189 |
| Unit – IV | | 10.3, 7.2 | 347–349, 351–352 276–277 |
| Unit – V | | 6.5, 10.9, 10.9.2, 10.9.3(2), 10.9.8 | 224–225, 374–378, 380–381, 389-390 |

**Book for Reference:**

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

**Web References:**

***Cathetar method:***

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

***Angiography:***

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

***LASIK Eye Surgery****:*

https://www.webmd.com/eye-health/lasik-laser-eye-surgery#1-1
https://www.allaboutvision.com/visionsurgery/lasik_laser.htm

**On-line Course:** *https://swayam.gov.in/nd1_noc20_cy17/preview*

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

| **Semester IV** | **Code 20UPH4GE2** | | **Title of the Course MEDICAL PHYSICS** | | | | | | **Hours 2** | **Credits 2** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| CO5 | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Number of matches (√) = 45 (ie.) 90 %, Relationship : Very High | | | | | | | | | | |

Prepared by :

Dr. J. Ebenezar

Checked by :

Mr. A. Mohamed Saleem

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| IV | 20UPH4CC8P | CORE – VIII | MEASUREMENT AND CALIBRATION - PRACTICAL | 3 | 2 | 100 | 20 | 80 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Acquire the basic principles of properties of matter and underlying the concepts of bending behaviour beams.
2. Learn the experimental skills.
3. Familiarise the concept of heat, optics and acoustics. understood the measurements of some physical quantities through heat and optical experiments.
4. Learn the measurements and calibration techniques of various instruments.
5. Acquire the basic requirements for their higher studies.

**List of Experiments:**

1. Determination of the Young's modulus [Y] of a material: Cantilever Depression (Scale and Telescope).
2. Determination of Static Torsion using Searle's Apparatus.
3. Determination of the Co-efficient of viscosity [η] of a highly viscous liquid using Searle's Viscometer.
4. Study the frequency response of the LCR series resonance circuit.
5. Determination of the EMF of Thermocouple – Direct Deflection Method.
6. Calibration of an Ammeter using a Potentiometer.
7. Measurement of wavelength of monochromatic light using Fresnel Biprism.
8. Determination of the Band Gap Energy [Eg] of a thermistor using a Post Office Box.
9. Measurement of wavelength of monochromatic light using Michelson's interferometer.
10. Construction of NOT,AND, OR and EX-OR gates using NOR

**Books for Reference:**


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


**Web References:**

www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester IV** | **Code 20UPH4CC8P** | | **Title of the Course MEASUREMENT AND CALIBRATION PRACTICALS** | | | | | | **Hours 3** | **Credits 2** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| CO3 | ✓ | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| CO5 | ✓ | ✓ | | ✓ | | | | | ✓ | |
| Number of matches (√) = 35 (ie.) 70 %, Relationship : High | | | | | | | | | | |

Prepared by

Mr. S. Mohamed Ibrahim Sulaiman Sait

Checked by

Mr. A. Mohamed Saleem

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| III | 20UPH3AC5 | Allied - V | ELECTRICITY AND MAGNETISM | 4 | 3 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Use the principle of superposition and Gauss law to calculate the electrical forces and the intensity of the electric field in various electricity problems.
2. Understand the basics of electrical circuits, capacitors and resistors and analyze circuits using Kirchhoff 's laws.
3. Understand the concepts of self induction and mutual induction, to solve problems using Faraday's and Lenz's laws.
4. Apply the knowledge of Electricity and Magnetism to explain natural physical processes and related technological advances.
5. Analyze different problems in Electromagnetism using vectors, simple differential and ntegral calculus, both analytically and numerically

**UNIT I: Electrostatics (12 Hours)**

Coulomb's Law – Gauss's Law and its applications: Electric Field due to a uniformly charged sphere– Electric Potential – Potential at a point due to a uniformly charged conducting sphere – #Principle of a capacitor#– parallel plate capacitor - energy stored in a charged capacitor–Loss of energy on sharing of charges between two capacitors.

**UNIT II: Current Electricity (12 Hours)**

Biot Savart's law-Magnetic induction at a Point due to a straight conductor carrying current-Ampere's circuital law-#Kirchhoff's Laws#– Application of Kirchhoff's laws to Wheatstone's bridge–Carey Foster's Bridge–Potentiometer– Calibration of Ammeter and Voltmeter (Low range) - Comparison of capacitances of two capacitors.

**UNIT III: Magnetostatics (12 Hours)**

Magnetic field #Magnetization– Magnetic Susceptibility# – Magnetic Permeability- Magnetic field for a Long Straight Current Carrying Wire – Magnetic Shell – Potential at any point due to a magnetic shell – Magnetic potential and field at a point and axis of a flat circular magnetic shell– The Hall Effect- Quantitative analysis of Hall effect – Applications of Hall Effect.

**UNIT IV: Electromagnetic Induction (12 Hours)**

#Laws of electromagnetic induction– Lenz's law# - Self-induction - Self-inductance of a long solenoid -Determination of self-inductance by Anderson's method–Mutual induction –Experimental determination of Mutual inductance –Coefficient of coupling.

**UNIT V: AC Circuits (12 Hours)**

#Peak value, Mean value and RMS value of an alternating current# – form factor –A.C circuit containing LR and CR in series – A.C circuit containing L, C and R in seriesand parallel–Q factor– Comparison between Series and Parallel resonant circuits –Power in AC circuit.

**# Self study portions#**

**Text Book:**
R. Murugeshan, Electricity and Magnetism, S. Chand & Company Ltd, New Delhi (2006).

Unit – I : 1.2, 2.2, 2.5, 3.5, 4.1- 4.11
Unit – II: 6.6, 7.1 – 7.4, 10.2 – 10.17
Unit – III: 15.2 – 15.5, 22.2, 22.6 - 22.8, 22.10
Unit – IV: 11.1 – 11.10
Unit – V: 13.1 – 13.4, 30.4 – 30.5

**Book for Reference**
Electricity and Magnetism- Brijlal and N.Subramaniam, Ratan Prakash Mandir, S.Chand& company, New Delhi 1995.

**Web Reference**

1. https://www.wiziq.com/tutorials/electricity-and-magnetism
2. https://www.electronics-tutorials.ws/capacitor/cap_1.html
3. https://ocw.mit.edu/courses/physics/8-022-physics-ii-electricity-and-magnetism-fall-2004/lecture-notes/

**Online Course Reference**

**Unit I :**https://swayam.gov.in/nd1_noc20_ph08/preview

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

| **Semester III** | **Code 20UPH3AC5** | | **Title of the Course ELECTRICITY AND MAGNETISM** | | | | | | **Hours 4** | **Credits 3** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | | ✓ | | | ✓ | ✓ | | |
| CO4 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Number of matches (√) = 40 (ie.) 80 %, Relationship : High | | | | | | | | | | |

Prepared by :

2. Dr. S. Shek Dhavud

Checked by :

1. Dr. C.Hariharan

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| III | 20UPH3AC6P | ALLIED –VI | APPLIED PHYSICS I - PRACTICAL | 3 | 2 | 100 | 20 | 80 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Understand the basic principles of Electricity and Magnetism
2. Acquire the experimental skills.
3. Understand the characteristics of the semiconductor diodes and operational amplifiers.
4. Understand the practical applications of Electricity ,Magnetism and Electronics in their day to day life.
5. Acquire the basic requirements for their higher studies.

**List of Experiments:**

1. LCR – Series
2. Meter bridge – R & ρ
3. PN Junction and Zener diode characteristics
4. Potentiometer – Low range voltmeter calibration
5. Wave shaping Circuits (Positive & Negative Clippers & Clampers)
6. Op-Amp – Adder and Subtractor
7. Field Coil – Determination of M
8. Figure of Merit – Table Galvanometer

**Books for Reference:**


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


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

| Semester III | Code 20UPH3AC6P | Title of the Course APPLIED PHYSICS - PRACTICALS I | | | | | Hours 3 | Credits 2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| CO2 | ✓ | | ✓ | | ✓ | | ✓ | ✓ | ✓ | | |
| CO3 | ✓ | | | | ✓ | | ✓ | ✓ | ✓ | | |
| CO4 | ✓ | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Number of matches (√) = 36 (ie.) 72 %, Relationship : High | | | | | | | | | | | |

Prepared by :

1. Dr. S. Shek Dhavud

Checked by :

1. Dr. C.Hariharan

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| IV | 20UPH4AC7 | ALLIED - VII | ELECTRONICS | 5 | 3 | 100 | 25 | 75 |

**Course Outcomes:**

**At the end of this course, students will be able to**

1. Acquire the basic knowledge on semiconductor and their applications.
2. Understand the concepts for solving real time problems related with electronic circuits.
3. Acquire the ability to design and analyse the circuit containing diode, transistor and operational amplifiers.
4. Learn the lasing mechanism , types and applications of laser .
5. Imbibe the basics of diode, transistor and FET characteristics.

**Unit – I Semiconductor Physics (15 Hours)**

Intrinsic & Extrinsic Semiconductors – n-Type and p-Type semiconductors-Formation of PN Junction Diode -V-I characteristics –#Zener diode# –V-I characteristics – Zener diode voltage regulator -Rectifiers – Half wave &Full wave bridge rectifier.

**Unit – II Transistors (15 Hours)**

Transistor action: npn & pnp–Transistor characteristics CE and CB configuration –α and β relationship-Amplifier – Single Stage RC Coupled Amplifier –Principle of feedback –**#**Types of feedback **#**–Barkhausen criterion – Oscillator – Hartley oscillator.

**Unit – III Special Devices (15 Hours)**

FET – Construction – n channel and p channel – FET Characteristics – FET parameters – FET amplifier (CS configuration) –Photo diode –Construction- Characteristics - LED – Construction- Characteristics- #LCD#- Construction - Seven segment display.

**Unit – IV Laser and Optical Fiber (15 Hours)**

#Laser Principle# – Stimulated Emission –Spontaneous emission-Population Inversion – Optical Pumping – Properties of Laser – Ruby laser – He-Ne laser -–– **#**Applications of laser**#** - Types of fibers- Semiconductor laser source for optical communication-Block diagram of fiber optic communication system.

**Unit – V Operational Amplifier (15 Hours)**

Ideal Op-amp – Parameters – Inverting and Non-Inverting Operational Amplifiers – Adder – Subtractor – Sign changer – **#**Scale changer**#** – Op-amp Differentiator -Op-amp Integrator.

# Self Study Portions #

**Text Books:**

1. Principle of Electronics –V.K. Mehta & Rohit Metha - S. Chand & Co
2. Modern Physics – R.Murugesan ,Kiruththiga SivaPrasath ,S. Chand & Co Thirteenth Edition.

**Book for Reference:**


1. Semiconductor Physics And Opto-Electronics –P.K.Palanisamy, Scitech Publications (India).Pvt.Ltd
2. Applied Physics – Dr. M. Arumugam – Anuradha Agencies
3. Laser and Optics – B.B.Laud, New Age International Publications


**Web references:**

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

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

| Semester IV | Code 20UPH4AC7 | | Title of the Course ELECTRONICS | | | | | | Hours 5 | Credits 3 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| CO3 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| CO4 | | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Number of matches (√) = 40 (ie.) 80 %, Relationship : High | | | | | | | | | | |

Prepared by : Checked by :

1. Dr. C. Hariharan Dr. A. S. Haja Hameed

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| IV | 20UPH4AC8P | ALLIED-VIII | APPLIED PHYSICS II - PRACTICAL | 3 | 2 | 100 | 20 | 80 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Acquire the basic principles of Electricity, Heat and Electronics.
2. Learn the experimental skills.
3. Understand the characteristics of the semiconductor diodes , transistors and operational amplifiers.
4. Learn the Electricity and Electronics circuit construction.
5. Acquire the basic requirements for their higher studies.

**List of Experiments:**

1. Transistor characteristics – CE configuration
2. Carey Foster's Bridge – R & $\rho$
3. Zener controlled rectifier
4. Potentiometer – Ammeter calibration
5. Band gap energy – Thermistor
6. Op-Amp – Differentiator and Integrator
7. Op-Amp Astable Multivibrator
8. Basic Logic gates – Discrete Components

**Books for Reference:**


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

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

| Semester IV | Code 20UPH4AC8P | Title of the Course APPLIED PHYSICS - PRACTICALS II | | | | | Hours 3 | Credits 2 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| CO2 | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | | |
| CO3 | ✓ | | | | ✓ | ✓ | ✓ | ✓ | | |
| CO4 | ✓ | | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Number of matches (√) = 36 (ie.) 72 %, Relationship : High | | | | | | | | | | |

Prepared by :

1. Dr. S. Abbas Manthiri

Checked by :

1. Dr. S.Shek Dhavud

Note:

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

## B.Sc. Physics Course Structure under CBCS

(Applicable to the candidates admitted from the academic year 2020-2021 onwards)

| SEM | COURSE CODE | PART | COURSE | COURSE TITLE | Ins. Hrs. /Week | CREDIT | MARKS | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | CIA | ESE | |
| I | 20U1LT1/LA1/LF1/ LH1/LU1 | I | Language – I | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN1LE1 | II | English - I | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH1CC1 | III | Core – I | Properties of Matter and Acoustics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH1CC2P | | Core – II | Properties of Matter : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UCH1AC1:1 | | Allied –I | Inorganic, organic and Physical Chemistry -I | 5 | 4 | 25 | 75 | 100 |
| | 20UCH1AC2P | | Allied –II | Practical - I - Volumetric Estimations | 3 | 2 | 20 | 80 | 100 |
| | 20UCN1AE1 | IV | AEC-I | Value Education | 2 | 2 | 100 | - | 100 |
| | | | | **TOTAL** | **30** | **21** | | | **700** |
| II | 20U2LT2/LA2/LF2/ LH2/LU2 | I | Language – II | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN2LE2 | II | English – II | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH2CC3 | III | Core – III | Mechanics and Relativity | 6 | 5 | 25 | 75 | 100 |
| | 20UPH2CC4P | | Core – IV | Heat and Optics : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UCH2AC3:1 | | Allied – III | Inorganic, organic and Physical Chemistry –II | 4 | 3 | 25 | 75 | 100 |
| | 20UCH2AC4P | | Allied –IV | Practical -II - Organic Analysis | 3 | 2 | 20 | 80 | 100 |
| | 20UCN2SE1 | IV | Skill enhancement course-1@ | Soft Skills Development | 2 | 2 | 100 | - | 100 |
| | | | | **TOTAL** | **30** | **20** | | | **700** |
| III | 20U3LT3/LA3/LF3/ LH3/LU3 | I | Language– III | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN3LE3 | II | English – III | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH3CC5 | III | Core– V | Thermal Physics | 4 | 4 | 25 | 75 | 100 |
| | 20UPH3CC6P | | Core– VI | Thermal and Electricity : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UMA3AC5:2 | | Allied– V | Differential and Integral Calculus | 4 | 3 | 25 | 75 | 100 |
| | 20UMA3AC6:2 | | Allied–VI | Algebra and Trigonometry | 3 | 2 | 25 | 75 | 100 |
| | 20UPH3GE1 | IV | Generic Elective I # | | 2 | 2 | - | 100 | 100 |
| | 20UCN3AE2 | | AEC-II | Environmental Studies | 2 | 2 | 100 | - | 100 |
| | | | | **TOTAL** | **30** | **21** | | | **800** |
| IV | 20U4LT4/LA4/LF4/ LH4/LU4 | I | Language–IV | | 6 | 3 | 25 | 75 | 100 |
| | 20UCN4LE4 | II | English– IV | | 6 | 3 | 25 | 75 | 100 |
| | 20UPH4CC7 | III | Core– VII | Optics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH4CC8P | | Core - VIII | Measurement and Calibration : Practicals | 3 | 2 | 20 | 80 | 100 |
| | 20UMA4AC7:2 | | Allied– VII | Differential Equations | 4 | 3 | 25 | 75 | 100 |
| | 20UMA4AC8:2 | | Allied–VIII | Vector Calculus and Fourier series | 4 | 2 | 25 | 75 | 100 |
| | 20UPH4GE2 | IV | Generic Elective – II # | | 2 | 2 | - | 100 | 100 |
| | 20UCN4EA | V | Extension Activities | NCC, NSS, etc. | - | 1 | - | - | - |
| | | | | **TOTAL** | **30** | **21** | | | **700** |
| V | 20UPH5CC9P1 | III | Core – IX | Optics and Numerical Programming : Practicals | 3 | 3 | 10 | 40 | 50 |
| | 20UPH5CC9P2 | | | Analog Electronics and Microprocessor:Practicals | 3 | 2 | 10 | 40 | 50 |
| | 20UPH5CC10 | | Core – X | Electricity, Magnetism and Electromagnetism | 5 | 5 | 25 | 75 | 100 |
| | 20UPH5CC11 | | Core – XI | Spectroscopy | 5 | 5 | 25 | 75 | 100 |
| | 20UPH5CC12 | | Core - XII | Atomic Physics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH5DE1A/B | | DSE-I ** | | 5 | 4 | 25 | 75 | 100 |
| | 20UPH5SE2A/B | IV | SEC II @ | | 2 | 2 | -- | 100 | 100 |
| | 20UPH5SE3A/B | | SEC III @ | | 2 | 2 | -- | 100 | 100 |
| | 20UPH5EC1 | | Extra Credit Course – I | General Intelligence for Competitive Examinations | **-** | **4*** | **--** | **100*** | **100*** |
| | | | | **TOTAL** | **30** | **28** | | | **700** |
| VI | 20UPH6CC13P1 | III | Core– XIII | General Physics and Scientific Programming : Practicals | 3 | 3 | 10 | 40 | 50 |
| | 20UPH6CC13P2 | | | Digital Electronics and Microprocessor: Practicals | 3 | 3 | 10 | 40 | 50 |
| | 20UPH6CC14 | | Core– XIV | Wave Mechanics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH6CC15 | | Core - XV | Nuclear Physics | 5 | 5 | 25 | 75 | 100 |
| | 20UPH6CC16 | | Core XVI | Laser and Medical Physics | 4 | 4 | 25 | 75 | 100 |
| | 20UPH6DE2A/B | | DSE II ** | | 5 | 4 | 25 | 75 | 100 |
| | 20UPH6DE3A/B | | DSE III ** | | 4 | 4 | 25 | 75 | 100 |
| | 20UCN6AE3 | IV | AEC-III | Gender Studies | 1 | 1 | 100 | - | 100 |
| | 20UPH6EC2 | | Extra Credit Course - II | Physics for Competitive Examination | **-** | **4*** | **--** | **100*** | **100*** |
| | 20UPHAECA | | Extra Credit Course for all | Online Course | **-** | **1*** | **-** | **-** | **-** |
| | | | | **TOTAL** | **30** | **29** | | | **700** |
| | | | | **GRAND TOTAL** | **180** | **140** | **-** | **-** | **4300** |

* Not Considered for Grant Total and CGPA

## @ Skill Enhancement Courses

| SEMESTER | COURSE CODE | COURSE TITLE |
|---|---|---|
| V | 20UPH5SE2A | Scientific programming in C |
| | 20UPH5SE2B | Programming in C++ |
| | 20UPH5SE3A | Electrical and Electronic Instrumentation |
| | 20UPH5SE3B | Electrical and Electronic Appliances |

## ** Discipline Specific Electives

| SEMESTER | COURSE CODE | COURSE TITLE |
|---|---|---|
| V | 20UPH5DE1A | Semiconductor Devices and Circuits |
| | 20UPH5DE1B | Fundamentals of Nanoscience |
| VI | 20UPH6DE2A | Digital Electronics and Microprocessor |
| | 20UPH6DE2B | Materials Science |
| | 20UPH6DE3A | Non Conventional Energy Physics |
| | 20UPH6DE3B | Astrophysics |

## # Generic Electives for other Major department

| SEMESTER | CODE | COURSE TITLE |
|---|---|---|
| III | 20UPH3GE1 | Physics for Home Appliances |
| IV | 20UPH4GE2 | Medical Physics |

## PROGRAMME OUTCOMES – SCIENCE

**Undergraduates will be able to**

1. Discuss current scientific facts, concepts, fundamental principles and scientific theories in solving societal problems and make informed decisions in scientific contexts.

2. Transcribe scientific ideas, arguments and practical experiences and demonstrate laboratory skills in handling new scientific techniques and equipments safely and ethically.

3. Recognize the benefits and limitations of science and its application in technological developments.

4. Demonstrate an ability to pursue higher education as an independent learner and become entrepreneurs in the relevant discipline.

5. Devise strategies to meet community requirements and serve as responsible citizens.

## B.Sc Physics Programme Specific Outcomes

The students of the B.Sc., Physics Programme on completion of their graduation should

1. Possess a sound knowledge of the basic concepts in Physics so that they could learn more complex theories later with ease.

2. Possess the essential skills in instrumentation / laboratory equipments so that they could have a better understanding of experiments.

3. Possess an inquisitiveness and scientific temper so that they could appreciate newer technological developments.

4. Be in a position to prepare themselves for admission to higher studies or else to become entrepreneurs in their relevant discipline.

5. Be able to apply the knowledge that they have gained to trouble-shoot simple day-to-day problems and fit in their community.

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC9P1 | CORE – IX | OPTICS AND NUMERICAL PROGRAMMING - PRACTICALS | 3 | 3 | 50 | 10 | 40 |

**Course Outcomes:**

At the end of this course, students will be able to

1. acquire the basic principles of properties of matter and underlying the concepts of bending behaviour beams.
2. learn the practical skills essential for experimentation.
3. familiarise themselves the concept of optical experiments.
4. understand the theory and practical applications of numerical programming.
5. acquire the basic concepts required for their higher studies.

**List of Experiments:**

1. Determination of the Young's modulus [Y] of a material: Koenig's Method.
2. Determination of the specific rotatory power of solution using a polarimeter by monochromatic light.
3. *i-d curve*: Determination of Refractive Index of Glass using a prism and a Spectrometer.
4. Determination of Refractive Index of Glass by forming Newton's Rings.
5. To find the band gap and Fermi level of a semioconductor
6. #**Determination of Rydberg's constant using a grating#.**
7. Programming Exercises using Control statements [*if, if-else, switch*]
   - Finding the solution of a quadratic equation using switch statement.
   - Conversion of temperature from Celcius to Fahrenheit scale.
8. Programming Exercises using Loops and Nested Loops [*while, do-while, For*]
   - To find the factorial of a number.
   - To construct the multiplication table from 1 to 20.
9. Programming Exercises using One-Dimensional Arrays
   - To print the elements of an array.
   - To sort the elements of an array in ascending order.
   - To find the biggest and smallest elements of an array.
   - To construct the Fibonacci series using arrays
10. **#Determination of q, n, σ by elliptical fringes method#**

**# - New experiment introduced under DBT Star College scheme**

**Books for reference:**


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

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


**Web References:**
www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester** | **Code** | | | **Title of the Course** | | | | **Hours** | **Credits** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | **20UPH5CC9P1** | | | **OPTICS AND NUMERICAL PROGRAMMING - PRACTICALS** | | | | **3** | **3** |
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO 2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ |
| CO4 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ |
| Number of matches = 36 (ie.) 72 %, Relationship - High | | | | | | | | | | |

Prepared by
Dr. A. Ishaq Ahamed

Checked by
Dr. S. Prabhakaran

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC9P2 | CORE – IX | ANALOG ELECTRONICS AND MICROPROCESSOR - PRACTICALS | 3 | 2 | 50 | 10 | 40 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Develop the skills in analog experiments
2. Learn the applications of operational amplifier.
3. Gain a clear understanding of operations of electronic circuits..
4. Practice the assembly language programs of 8085 microprocessor using trainer kit.
5. Acquire the basic concepts required for their higher studies.

**List of Experiments:**

1. Frequency Characteristics of a Single Stage R-C Coupled Amplifier.
2. Adder (Inverting and Non-inverting Modes), Subtractor using Op-amp IC741
3. Integrator and Differentiator Circuits using IC741 Op-Amps.
4. Hartley Oscillator
5. Block Transfer of Data using µp 8085.
6. Eight bit Addition and Subtraction using µp 8085.
7. Sorting of Data in Ascending order and Descending order using µp 8085.
8. Conversion of Binary Numbers to BCD coded form.
9. **#Electrical and Electronic Patents in Patent Databases**
10. Astable multivibrator using Op-Amp.

**# - New experiment introduced under DBT Star College scheme**

**Books for reference:**


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


**Web References:**

www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester** | **Code** | | | **Title of the Course** | | | **Hours** | | **Credits** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | **20UPH5CC9P2** | | | **ELECTRONICS AND MICROPROCESSOR - PRACTICALS** | | | **3** | | **2** |
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ |
| CO4 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ |
| Number of matches = 36 (ie.) 72 %, Relationship - High | | | | | | | | | | |

Prepared by
Mr. A. Mohamed Saleem

Checked by
Dr. C. Hariharan

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC10 | CORE – X | ELECTRICITY MAGNETISM AND ELECTROMAGNETISM | 5 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

CO 1: acquire the knowledge of electric and magnetic fields. Apply the concepts to calculate electric fields due to various charge distributions and magnetization of a material.

CO 2: understand the theoretical concepts of various magnetic materials.

CO 3: gain in an understanding of magnetic fields and their relationship to electrical fields.

CO 4: perform quantitative calculations involving electric and magnetic fields.

CO 5: demonstrate electrical equipment to measure the electrical parameters.

**Unit – I: Electrostatics (15 Hours)**

Electric field– Electric field due to point charge-lines of force –Flux of the electric field – Gauss law –Electric field due to a uniformly charged sphereand infinite cylindrical charge – Coulomb's theorem – mechanical force experienced by unit area of a charged conductor –#Energy stored per unit volume in the medium surrounding the charged conductor# - Electric potential – Potential at a point due to a point charge

Capacitance of a conductor - Principle of a capacitor – Capacitance of spherical and cylindrical capacitors – Capacitance of parallel plate capacitor partly filled with dielectric slab – energy stored in a charged capacitor – loss of energy on sharing of charges between two conductors

**Unit – II: Magnetic Properties of Materials (15 Hours)**

Magnetic induction (B) – Magnetization (M) - Magnetic susceptibility – Magnetic permeability - Properties of dia,para and ferromagnetic materials–Anti-ferro and ferrimagnetism – The electron theory of magnetism – Langevin's theory dia and paramagnetism - Weiss's theory of Ferromagnetism – Experiment to draw M-H curve (Horizantal model) – Energy loss due to hysteresis –# The importance of hysteresis curve #

**Unit–III:Current Electricity (15 Hours)**

Kirchoff's laws – Wheatstone bridge - Carey Foster's bridge – Specific resistance - temperature coefficient of resistance -Potentiometer –Calibration of ammeter, low range and high range voltmeter

The Biot-Savart law – Magnetic intensity at a point due to a current carrying straight conductor, axis of a circular coil and solenoid – Force on a conductor current-carrying current in a magnetic field –torque on a current loop in a uniform magnetic field - Moving coil ballistic galvanometer – damping correction

**Unit – IV: Electromagnetic Induction (15 Hours)**

Faraday's Laws of electromagnetic induction – Self induction - Self inductance of a long solenoid – Determination of selfinductanceby Anderson's Bridge method - Mutual inductance – #mutual inductance of long solenoid# - Experimental determination of mutual inductance- Coefficient of coupling – Eddy currents and its applications

**Unit – V: Alternating Current(A.C) (15 Hours)**

Peak value, Mean value, Form factor and effective value of an alternating current–

A.C circuit containing Resistance, Inductance and Capacitance in series – series resonance circuit – The Q factor - use of j operator in study of A.C Circuits– parallel resonant circuit (LCR) – power in A.C circuit containing Resistance, Inductance and Capacitance–Wattless current -Choke coil

**#.....# self-study portion**

**Text Books:**

1. R.Murugeshan, Electricity and Magnetism ,S.Chand& company, Fourth Revised Edition 2002

| Units | Chapter |
|---|---|
| Unit – I | 1.4, 1.5, 1.11, 2.1, 2.2, 2.5, 2.6, 2.11 - 2.13, 3.3, 4.1 - 4.4, 4.7, 4.9, 4.11 |
| Unit – II | 15.1, 15.2, 15.4 - 15.8, 15.10 - 15.13, 15.14, 15.16, 15.17 |
| Unit – III | 6.6, 7.1, 7.2, 10.2 - 10.4, 10.6, 10.10, 10.11 |
| Unit – IV | 11.1, 11.3, 11.4, 11.6 - 11.10, 11.16 |
| Unit – V | 13.1 - 13.6 |

**Books for references:**


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


**Web References:**

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

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

| Semester | Code | Title of the Course | | | | | Hours | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC10 | ELECTRICITY MAGNETISM AND ELECTROMAGNETISM | | | | | 5 | 5 | | | |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| CO3 | ✓ | | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | |
| CO5 | ✓ | ✓ | | ✓ | | | | ✓ | | ✓ | |
| Number of matches = 38, Relationship : High | | | | | | | | | | | |

Prepared by :
Mr. A. Mohamed Saleem

Checked by :
Dr.C.Hariharan

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC11 | CORE – XI | SPECTROSCOPY | 5 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. acquire the basic principle of spectroscopy
2. understand the concepts of Microwave, Raman and Resonance Spectroscopy.
3. familiarise with general terms in spectroscopy.
4. understand the theory and practical applications of Mossbauer Spectroscopy
5. learn the fundamental ideas for pursuing higher studies.

**Unit – I: Concepts in Spectroscopy** **(15 Hours)**

Properties of Electromagnetic Radiation – Electromagnetic Spectrum – Different types of Molecular Energies – Interaction of Electromagnetic Radiation with Matter – Molecular Absorption of Electromagnetic Radiation – Types of Molecular Spectra – Characteristics of Spectral lines.

**Unit – II: Microwave Spectroscopy** **(15 Hours)**

Differences between Infrared and Microwave Spectroscopy – Theory of Microwave Spectroscopy – Linear Molecules – Spherical Top Molecules – Symmetric Top Molecules – Asymmetric Top Molecules – The Stark Effect – Instrumentation for Microwave Spectroscopy – Applications of Microwave Spectroscopy

**Unit – III Raman Spectroscopy** **(15 Hours)**

Introduction – Principle – Characteristic properties of Raman lines Differences between Raman and IR spectra – Mechanism of Raman effect – Instrumentation – Intensity of Raman Peaks – Applications of Raman Spectroscopy

**Unit – IV: Resonance Spectroscopy** **(15 Hours)**

Principles of ESR – ESR Spectrometer – ESR Spectra of free radicals solution – The Quadrupole nucleus – Principle of Nuclear Quadrupole Resonance – NQR Instrumentation – Nitrogen Quadrupole Resonance – Hydrogen Bonding

**Unit – V Mossbauer Spectroscopy** **(15 Hours)**

Recoilless Emission and Absorption – Experimental Techniques – Isomer Shift – Quadrupole Interaction – Magnetic Hyperfine Interaction

**Text Books:**


1. G. Aruldhas., Molecular Structure and Spectroscopy, PHI Ltd, Second Edition 2017.
   Unit – IV: Chapter: 11.2, 11.3, 11.6, 12.1, 12.2, 12.5, 12.10, 12.12.
   Unit – V: Chapter: 13.1 – 13.6.
2. Gurdeep R. Chatwal & Sham K.Anand., Spectroscopy (Atomic and Molecular) –Himalaya Publishing House.
   Unit – I: Chapter: 1.2 – 1.13, 1.16
   Unit – II: Chapter: 2.7 – 2.23
   Unit – III: Chapter: 2.83 – 2.99

**Books for Reference:**

Colin N. Banwell and Elaine M. McCash, Fundamentals of Molecular Spectroscopy, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2010.

**Web References::**

https://nptel.ac.in/courses/104104085/34

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC11 | | SPECTROSCOPY | | | | | | 5 | 5 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| CO3 | ✓ | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| CO5 | ✓ | ✓ | | ✓ | | | | | ✓ | |
| Number of matches = 36, Relationship : High | | | | | | | | | | |

Prepared by :
Dr. R. Raj Muhamed

Checked by :
Mr. A. Abbas Manthiri

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC12 | CORE – XII | ATOMIC PHYSICS | 5 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Study about the properties of positive rays and photo electric effect and its applications.
2. Learn the practical experiments and laboratory skills.
3. Understand the evolution of different atomic models and their merits and limitations.
4. Analyse the effect of applied magnetic and electric fields of atomic spectra and X-rays.
5. Learn the fundamental ideas for pursuing higher studies.

**Unit – I: Positive ray analysis (15 Hours)**

Production and properties of positive rays– Positive Ray Analysis - Thomson's Parabola method – Discovery of stable isotopes –Aston's Mass spectrograph –Bainbridge's Mass spectrograph –Dempster's Mass spectrograph -Critical Potentials- Experimental determination -Franck and Hertz's method

**Unit –II: Photo Electricity (15 Hours)**

The nature of Photo-particles -Photoelectric emission – laws – Lenard's method to determine e/m for photoelectrons - Richardson & Compton experiment -Einstein's Photoelectric equation and its verification by Millikan's experiment – Photoelectric cells: Photo-emissive cell – Photo-voltaic cell- Photoconductive cell- Applications- Exposure meter in photography Photomultiplier – exposure meter in photography – Sound reproduction in films – Automatic operation of street light.

**Unit – III: Vector atom model (15 Hours)**

Introduction – spatial quantization – spinning electrons - Various quantum numbers - L-S and j-j couplings – Pauli's exclusion principle – applications - magnetic dipole moment of electron due to orbital and spin motions – Bohr magneton – Stern and Gerlach experiment – spin orbit coupling

**Unit – IV: Optical Spectral Lines 15 Hours)**

Spectral terms and notation- Selection rules – intensity rule and interval rule – Fine Structure of sodium D lines – hyperfine structure – Zeeman effect- Expression for the Zeeman shift– Larmor's theorem – Debye's quantum mechanical explanation of the normal Zeeman effect – Quantum mechanical explanations of Anomalous Zeeman effect – Paschen-Back effect – Stark effect

**Unit – V: X- Rays (15 Hours)**

X-Rays – Production of X-Rays- Bragg's Law – Bragg's X-ray spectrometer – determination of crystal structure – The powder crystal method – Rotating crystal method-Origin and analysis of Continuous and Characteristic X-ray spectra–Mosley's law and its importance – Compton effect – Expression for change in wavelength– Experimental verification.

**Text Book:**

1. R.Murugeshan , Kiruthiga Sivaprasath, Modern Physics , 14th revised multi colour edition, S.Chand & Co Publications, Reprint 2010.
   Unit – I: Chapter 5.1-5.6, 6.8,6.10

   Unit – II: Chapter 8.1-8.6

   Unit – III: Chapter 6.12 - 6.21

   Unit – IV: Chapter 6.22 - 6.28

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

**Books for Reference:**


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


**Web References:**

1.https://iopscience.iop.org/book/978-1-64327-404-1

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

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| V | 20UPH5CC12 | | ATOMIC PHYSICS | | | | | | 5 | 5 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| CO3 | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| CO4 | | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| CO5 | ✓ | ✓ | | ✓ | | | | ✓ | ✓ | ✓ |
| Number of matches = 38, Relationship : High | | | | | | | | | | |

Prepared by :
S. Abbas Manthiri

Checked by :
S.Md,Ibrahim Sulaiman Sait

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5DE1A | DSE - 1 | SEMICONDUCTOR DEVICES AND CIRCUITS | 5 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Learn some basic semiconductor devices, means of identifying them from their coding schemes and finding out their terminals.
2. Acquire a knowledge of the principles and functioning of these semiconductor devices and their individual or standalone characteristic features using mathematical and graphical analysis so that they may be helpful in predicting their behavior and functioning when incorporated in circuitry.
3. Learn the essential techniques of circuit design employing these devices, the analysis of the circuits so constructed and the means of evaluating their parameters and performance using mathematical and graphical tools.
4. Obtain a sound knowledge of the essential theoretical features and concepts such as modulation and demodulation, regulated power supplies, amplification, switching operations so that they may be useful not only for higher studies but also in providing theoretical framework for possible applications beneficial to the society.
5. Acquire technical skills to wire the circuits and to trouble shoot them as well as to construct of new circuits for specific tasks thereby helping them to become entrepreneurs.

**Unit – I: Special-Purpose Diodes and Regulated Power Supplies (15 Hours)**

Zener Diode and its characteristics – Equivalent Circuit of a Zener diode – Zener Diode as voltage stabilizer – Light-Emitting Diode (LED) – Current and Voltage Characteristics of LEDs – Advantages of LEDs – #Multicolour LEDs–Application of LEDs#– Photo-diodes – Operation and Characteristics-Applications of Photo-diodes – Regulated Power Supply – IC Voltage Regulators: Fixed and Adjustable Voltage IC Regulators.

**Unit – II: Transistors and JFET (15 Hours)**

Transistor – Transistor Action – #Transistor Schematic Symbols # - Transistor connections – Common Emitter (CE) connection: Its characteristics and advantages – #Transistor Leads Identification – Transistor Testing# – Transistor Biasing – Methods of Transistor Biasing – Junction Field Effect Transistor (JFET) – Construction, Principle and Working – #Schematic Symbol – Importance – Difference between JFET and BJT #– Output Characteristics of FET – Parameters of JFET and the relationship among them.

**Unit – III: Amplifiers and Oscillators (15 Hours)**

Single Stage Amplifiers –Single Stage RC Coupled Transistor Amplifier – Phase Reversal – DC and AC Equivalent Circuits – Load Line Analysis – Voltage Gain – Feedback in Amplifiers – Principle, gain and advantages of Negative Voltage Feedback – Oscillatory Circuit– Barkhausen Conditions for Oscillations – #Explanations for the Barkhausen Conditions# - Colpitt's Oscillator - Hartley Oscillator.

**Unit – IV: Modulation and Demodulation (15 Hours)**

Radio Broadcasting, Transmission and Reception – Modulation – Necessity for Modulation – Types of Modulation –Amplitude Modulation – Modulation Factor - Analysis of AM Wave - Sideband Frequencies in AM wave – Power in AM wave – Limitations of AM – Frequency Modulation - Theory of Frequency Modulation - #Comparision of AM and FM# – Demodulation – Necessity for Demodulation – Essentials of Demodulation – AM Radio Receivers – Superheterodyne Radio Receiver –Advantages

**Unit – V: Operational Amplifier** **(15 Hours)**

Operational Amplifier – Characteristics of an Op-Amp – Inverting Amplifier – Inverting Summing Amplifier (Adder) – Non-Inverting Amplifier – Difference Amplifier (Subtractor), Differentiator and Integrator circuits – Astable and Monostable Multivibrators using Op-Amps.

**#.....# Self-Study Portion**

**Text Books :**

1. Principle of Electronics, V.K. Mehtha and Rohit Mehta, XI Edition (2014), S. Chand & Company, New Delhi.
   Unit–I: 6.25, 6.26, 6.27, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 17.3, 17.15, 17.16, 17.17, 17.18
   Unit–II: 8.1, 8.4, 8.5, 8.7, 8.10, 8.12, 8.15, 8.26, 8.27, 9.2, 9.7, 9.12, 19.1, 19.2, 19.3, 19.4, 19.5, 19.6, 19.8, 19.13, 19.14
   Unit–III: 10.1, 10.4, 10.5, 10.7, 10.8, 10.9, 13.1, 13.2, 13.3, 13.4, 14.3, 14.5, 14.7, 14.10, 14.11.
   Unit–IV: 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.9, 16.10, 16.11, 16.12, 16.3, 16.14, 16.15, 16.18, 16.19, 16.20
2. Introduction to Integrated Electronics: Digital & Analog, V. Vijayendran, I Edition (2007), S. Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai.

   Unit – V: 13.3, 13.4, 14.3, 14.4. 14.5, 14.8, 14.9, 14.10, 15.3, 15.4

**Books for Reference:**

1. Basic Electronics and Linear Circuits, Bhargava, Kulshreshtha and Gupta, V Reprint, (1992), Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
2. Basic Electronics, B. L. Theraja, Multicolour Edition (2005), S. Chand& Company, New Delhi.
3. Applied Electronics, R. S. Sedha, IV Edition (2008), S. Chand Publictions, New Delhi.

**Web References:**

1. https://www.elprocus.com/semiconductor-devices-types-and-applications/
2. https://www.coursera.org/learn/transistor-field-effect-transistor-bipolar-junction-transistor
3. https://nptel.ac.in/courses/108/108/108108112/
4. https://uafulucknow.ac.in/wp-content/uploads/2020/03/Unit-5-Electronics-Operational-Amplifier.pdf
5. https://www.analog.com/en/products/amplifiers/operational-amplifiers.html
6. https://www.electronicshub.org/operational-amplifier-basics/

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

| **Semester** | **Code** | | | **Title of the Paper** | | | | **Hours** | | **Credits** |
|---|---|---|---|---|---|---|---|---|---|---|
| **V** | **20UPH5DE1A** | | | **SEMICONDUCTOR DEVICES AND CIRCUITS** | | | | **5** | | **4** |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | | ✓ | ✓ | | | ✓ | | | ✓ | |
| CO2 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | |
| CO4 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ |
| CO5 | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Number of Matches = 37, Relationship: HIGH | | | | | | | | | | |

Prepared by:
Dr. A. Ishaq Ahamed

Checked by:
Dr. S. Shek Dhavud

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5DE1B | DSE - I | FUNDAMENTALS OF NANOSCIENCE | 5 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to
1. acquire knowledge about the structure and properties of nanomaterials
2. develop the skills to synthesis and analyze the nanomaterials
3. understand quantum and biological nanostructures
4. learn the applications of nanomaterials
5. learn the evaluation techniques for nano materials by spectroscopies and microscopes

**Unit – I: Introduction to nanoscience (15 Hours)**

Nanomaterials - Basics of nanomaterials - Nanotechnology - Four generations of Nanotechnology – Elementary ideas of nanostructures - Size dependence of properties- Crystal structures- Face-Centred Cubic nanoparticles.

**Unit – II: Methods of nano-materials (15 Hours)**

Classification of nanomaterials - Techniques of preparation - Bottom-up and Top-down methodologies- Sol-gel and chemical methods– RF Plasma – Thermolysis – Pulsed Laser method.

**Unit-III: Carbon nanotubes and fullerenes (15 hours)**

Types of carbon nanotubes - Single walled nanotubes (SWNT) - Multi walled nanotubes(MWNT)- Electrical, mechanical and vibrational properties- Fullerenes - Properties of fullerenes - **#Applications of fullerenes#.**

**Unit IV: Quantum and biological nanostructures (15 hours)**

Preparation of quantum nanostructures - Quantum dot – Quantum well – Quantum wire- Size effects - Applications -Infrared Detectors- Quantum dot Lasers- Biologicalnanostructures- **#Examples of Proteins#.**

**Unit V: Evaluation methods (15 hours)**

Particle size determination by X-ray-IR and Raman Spectroscopes- Photoluminescence -Surface analysis- Scanning Electron Microscope(SEM) – Transmission Electron Microscope (TEM) and Atomic Force Microscope (AFM).

**#.....# self-study portion**

**Text Books:**

**1. S. Shanmugam, "Nano Technology", MJP Publishers, Second edition, 2010.**
Unit I Chapter 1 & 2 Sections 1.2 - 1.3 & 2.2 -2.6
Unit II - IV Chapter 2 & 3 Sections 2.8 - 2.10 & 3.1 -3.5

**2. C.P. Poole and F.J. Owens, "Introduction to Nanotechnology", Wiley- Interscience, (2003).**
Unit I: Chapter 1, sections 2.1.1-3
Unit II: Chapter 4.5, sections 4.5.1-4
Unit III Chapter 5, sections 5.4.1-5
Unit IV:Chapter 9, sections 9.2, 9.3.1, 9.6.1 & 9.6.2

**3. M.A. Shah Tokeer Ahmad, "Principles of Nano Science and Nanotechnology", Narosa**
Unit-V: sections 4.3, 4.6, 3.3, 3.5, 3.6, 5.5, 5.6, 5.7, 5.8

**Book for Reference:**

1. "Nanomaterials", A.K. Bandyopadhyay, New Age International Publishers, (2008).

**Web References:**

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

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

| **Semester** | **Code** | | **Title of the Course** | | | | | | **Hours** | **Credits** |
|---|---|---|---|---|---|---|---|---|---|---|
| **V** | **20UPH5DE1B** | | **FUNDAMENTALS OF NANOSCIENCE** | | | | | | **5** | **4** |
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **CO2** | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| **CO3** | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| **CO4** | | | ✓ | | ✓ | | ✓ | | ✓ | ✓ |
| **CO5** | ✓ | | | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| Number of matches = **36**, Relationship: **High** | | | | | | | | | | |

Prepared by:

Dr. A.S. Haja Hameed

Checked by:
Dr. A.S. Haja Hameed

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE2A | SEC - II | SCIENTIFIC PROGRAMMING IN C | 2 | 2 | 100 | - | 100 |

**Course Outcomes:**

At the end of the course student will be able to

1: Able to install and run the c program on computer

2: Design, implement, test and debug programs that use different data types, such as simple variables, strings, arrays

3: Acquire a skill to write his own program for simple problems in general Physics in particular

4: Got self-confidence to self-learning any other programming languages and using it to solve numerical problems

5: Enhancing students chance in the job haunt

**Unit – I:C Basics (6 Hours)**

Importance of C – Basic structure of C Programs – Basic concepts of flowcharts and algorithms – conventions used in writing algorithms -Character set, Keywords and Identifiers – Constants – Variables –#Data Types#

**Advanced concepts:** Program development environments; Turboc/c++– Dev-c++ – code::Blocks

**Programming Exercises:** Algorithm and flowcharts for

1. To compute the largest of three numbers.
2. To find the average of n numbers.
3. To generate prime numbers between 1to n.

**Unit – II:Operators and Expressions (6 Hours)**

Arithmetic, Relational, Logical, Assignment, Increment and Decrement, ConditionalArithmetic expressions – #Operator Precedence and Associativity #

**Advanced concept:** Writing complex parenthesized expression– comma operator

**Programming exercise:**

1. Conversion of temperature from Celcius to Fahrenheit scale and vice versa.
2. Computation of area of a triangle given its three sides
3. Computation of area of a triangle given its base and height.

**Unit – III:Input, Output and Control Statements (6 Hours)**

General I/P and O/P functions: scanf&printf functions - format specifiers-#Conversion type characters for numeric and qualified data types#-Decision making statements: if, if-else, switch, go-to, break and continue statements

**Advanced concepts:** Streams– character classification and conversion

**Programming exercise:**

1. Finding the solution of a quadratic equation using if-else construct.
2. Finding the solution of a quadratic equation using switch statement.
3. . Finding the area of a triangle using switch statement-given (a) its three sides (b) its base and height.

**Unit – IV:Loops and Nested Loops (6 Hours)**

Loop Constructs – while loop – syntax and flowchart of while loop – do-while loop – syntax and flowchartof do-while loop –for loop –syntaxand flowchart of for loop Programming exercise:

**Advanced concepts:** variations in for loop – variations in the while and do... while loops

**Programming exercise:**

1. To find the prime numbers in a given range.
2. Conversion of decimal number into a binary number.
3. To check for leap years for the period 1901-2100.

**Unit – V:Arrays** **(6 Hours)**

One dimensional arrays: Array declaration-Accessing array elements-#Operations on array elements# –Operations on entire arrays—Array initialization

**Advanced concepts:** constants and vectors – Static arrays – External or global array

**Programming exercise:**

1. To sort the elements of an array in ascending order.
2. To find the average of a given set of elements using arrays.
3. To construct the Fibonacci series using arrays

**#.....# self-study portion**

**Text Books:**

| Units | References | Topics /Page numbers |
|---|---|---|
| Unit-1 | Programming in ANSI C-E. Balagurusamy, Tata Mc_Graw Hill, New Delhi,Sixth Edition,2013 | Topics: 1.2,1.8,1.9, 2.2,2.4,2.5,2.6,2.7, 2.8,2.10 |
| | Mastering C-K.R. Venugopal and S.R. Prasad,TataMc-GrawHill,New Delhi,2007 | Topics: 1.6,1.8<br>Algorithm Examples: 1.1,1.3,1.4,1.7,1.2 |
| | Programming with C-R.S.Bichkar, University press, First edition ,2012 | Topics:1.6.1,1.6.2,1.6.3 |
| Unit -2 | Programming in ANSI C-E. Balagurusamy, TataMc_Graw Hill, New Delhi,Sixth Edition,2013 | Topics: 3.2,3.3,3.4,3.5,3.6,3.7,3.10 |
| | Mastering C-K.R. Venugopal and S.R. Prasad,TataMc-Graw Hill,New Delhi,2007 | Topics: 2.15<br>Programming exercises: Example 2.10,2.11,2.12 |
| | Projects Using C-PVN. Varalakshmi, ScitechPublications, Chennai,2001 | Programming exercises: Example 2 |
| | Programming with C-R.S.Bichkar, University press, First edition ,2012 | Topics 3.4.1,3.4.3 |
| Unit-3 | Mastering C-K.R. Venugopal and S.R. Prasad,TataMc-GrawHill,New Delhi,2007 | Topics:.4,3.5,4.2,4.3,4.10,4.11,4.12,4.13 Programming exercises in pages 105,130,136 |
| | Programming with C-R.S.Bichkar, University press, First edition ,2012 | Topics 4.4.1,4.4.3 |
| Unit-4 | Mastering C-K.R. Venugopal and S.R. Prasad,TataMc-GrawHill,New Delhi,2007 | Topics: 4.6,4.8,4.9,4.7 Programming exercises in pages 134 |
| | Projects Using C-PVN. Varalakshmi, ScitechPublications, Chennai,2001 | Programming exercises: Example 22,23,35,4,29 |
| | Programming with C-R.S.Bichkar, University press, First edition ,2012 | Topics: 6.4.1,6.4.2 |
| Unit-5 | Programming with C-R.S.Bichkar, University press, First edition ,2012 | Topics 9.2.1-9.2.5,9.4.1-9.4.3 |
| | Mastering C-K.R. Venugopal and S.R. Prasad,TataMc-GrawHill,New Delhi,2007 | Programming exercises in pages 222,225,226 |
| | Projects Using C-PVN. Varalakshmi, Scitech Publications, Chennai,2001 | Programming exercises: Example 44,52 |

**Book for References:**


1. KanetkarYashavant, Let us C, BPB Publications, 15th Edition, 2018.
2. **Brian W. Kernighan**; **Dennis M. Ritchie**, The C Programming Language, Prentice, Second Edition, 1988.


**Web References:**

1. https://www.youtube.com/channel/UCB7j5By-VXOmjPhKDanUfQw/videos
2. https://www.udemy.com/course/c-programming-tutorial-for-absolute-beginners/?utm_source=adwords&utm_medium=udemyads&utm_campaign=DSA_Catchall_la.EN_cc.INDIA&utm_content=deal4584&utm_term=_._ag_82569850245_._ad_533220805574_._kw__._de_c_._dm__._pl__._ti_dsa-406594358574_._li_9040217_._pd__._&matchtype=b&gclid=CjwKCAjw0qOIBhBhEiwAyvVcf5dJ9Ts9G6kg9NcLiQ86Liq_M2ZIxKxyfgCmkjw2Tj5IU1oJkWwZzxoCNOkQAvD_BwE
3. https://www.tutorialspoint.com/cprogramming/index.htm

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE2A | | SCIENTIFIC PROGRAMMING IN C | | | | | | 2 | 2 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | | | ✓ | | ✓ | ✓ | | ✓ | |
| CO2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| CO3 | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| CO5 | ✓ | ✓ | | ✓ | | ✓ | | ✓ | ✓ | |
| Number of matches = 36, Relationship : High | | | | | | | | | | |

Prepared by:
Mr. J. Umar Malik

Checked by:
Mr. J. Umar Malik

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE2B | SEC - II | PROGRAMMING IN C++ | 2 | 2 | 100 | - | 100 |

**Course Outcomes:**

At the end of the course student will be able to
1: get general idea about object oriented languages
2: design, implement, test and debug programs that use different data types, such as simple variables, strings, arrays
3: acquire a skill to write his own program for simple problems
4: get self-confidence to self-learning any other programming languages and using it to solve numerical problems
5: enhance students chance in the job haunt

**Unit – I: Introduction to C++ (6 Hours)**

Basic Concept of Object Oriented Programming — Structure of C++ program — Characters used in C++ — Basic Data Types: integer, float, character, void — Data type modifiers: long, short, signed and unsigned — C++ tokens: Identifiers, Keyword, Constants — Variables — #Input-Output statements#

**Unit –II: Operators and expressions (6 Hours)**

Operators: Arithmetic — Unary arithmetic — Relational and logical — Rules of Logical Operators — Conditional — Order of Evaluation of Expression — Some Special Operators: Comma operator — sizeof()— #Assignment operator#.

**Unit –III: Conditional Statements (6 Hours)**

Selective Execution: if Statement — if… else Statement — Nested if Statement (if –else-if ladder) — Switch Statement — #break and continue statements#
Repetitive Execution: while loop —do… while loop — for loop — Nested loops

**Unit IV : Arrays and structures (6 Hours)**

Array: One Dimensional Arrays — Multidimensional Array — #Array Initialisation#
Structures: Defining a Structure in C++ — Referencing Structure Elements — Arrays of Structures — Initializing Structure — Nested Structure

**Unit V: Functions (6 Hours)**

The main function – function prototype – call by reference – return by reference – inline functions – default argument – constant argument – function overloading – friend and virtual function – #math library function#

**#.....# self-study portion**

**Text Books:**

1. Object-oriented programming with C++, A.K Sharma, First edition, Pearson publication, Delhi
   Unit-I Section 1.2- 1.4,1.6
   Unit-II Section 1.8
   Unit –III section 1.9
   Unit –IV section 1.10,1.11

2. Object oriented programming C++, E.Balagurusamy, third edition, Tata McGraw-Hill
   Unit- I Section 1.5
   Unit –V Section 4.2- 4.11

**Book for References:**

3. Kanetkar Yashavant, Let us C++, BPB Publications, 2nd Edition, 1999.
4. **Bjarne** Stroustrup, The C++ Programming Language,Addison-Wesley, 4th Edition, 2013.

**Web References**:

1. https://www.codecademy.com/learn/learn-c-plus-plus
2. https://www.youtube.com/watch?v=vLnPwxZdW4Y
3. https://www.youtube.com/watch?v=55lEuBLBTB8

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE2B | | PROGRAMMING IN C++ | | | | | | 2 | 2 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | | | ✔ | ✔ | ✔ | ✔ | | ✔ | |
| CO2 | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | | ✔ |
| CO3 | ✔ | ✔ | ✔ | | | | | | ✔ | ✔ |
| CO4 | ✔ | ✔ | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| CO5 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | |
| Number of matches = 35, Relationship : High | | | | | | | | | | |

Prepared by :
Mr. J. Umar Malik

Checked by :
Mr. J. Umar Malik

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE3A | SEC III | ELECTRICAL AND ELECTRONIC INSTRUMENTATION | 2 | 2 | 100 | -- | 100 |

**Course Outcomes:**

At the end of this course, students will be able to

**1.** identify the various parameters that are measurable in electronic instrumentation
**2.** analyze the performance characteristics of each electronic instrument
**3.** understand the principles of various types of transducer
**4.** apply the complete knowledge of various electronics instruments to measure the Physical quantities in the field of science and technology
**5.** disseminate knowledge on semiconductor circuit layout design protection and their registration aspects

**Unit – I: Analog Instruments (6 Hours)**

DC Voltmeter – Multirange Voltmeter – Transistor Voltmeter (TVM) – Solid State Voltmeter – Differential Voltmeter – AC Voltmeter using rectifiers – AC Voltmeter using half wave rectifier **#**AC Voltmeter using full wave rectifier**#** – Ohmmeter (Series Type) – Multimeter Operating Instructions.

**Unit – II: Digital Instruments (6 Hours)**

Digital Multimeter – Digital Frequency Meter – Digital Measurement of Time: Time Base Selector – Period Measurement – **#**Digital Tachometer**#** – Digital pH meter – Digital Phase Meter – Digital Capacitance Meter.

**Unit –III: Digital Display System and Intellectual Property Rights (IPR) (6 Hours)**

Classification of Displays – Light Emitting Diode – Liquid Crystal Display – Gas Discharge Plasma Display – Segmented Gas Discharge Display – Segmental Displays using LEDs – **#**Electro Luminescent Display**#**.

**IPR:** Concept of IPR in Electronic Circuits – Design of Semiconductor Integrated Circuits Layout.

**UNIT – IV: Waveform Analysis and Harmonic Distortion (6 hours)**

Basic Wave Analyzer – Frequency Selective Wave Analyzer – Heterodyne Wave Analyzer – Harmonic Distortion Analyzer – Resonance Bridge Method – Wien's Bridge Method – Bridged T-Network Method – Spectrum Analyzer.

**UNIT – V: Transducers (6 hours)**

Electrical Transducer – **#**Advantages**#** – Inductive transducer – Differential Output Transducers – Advantages – Linear Variable Differential Transducer (LVDT) – **#**Advantages**#** – Rotational Variable Differential Transducer (RVDT) – Advantages – Piezo Electric Transducer.

**#.....# Self-study portion**

**Text Books:**

1. H.S. Kalsi, Electronic Instrumentation, Third Edition, Mc Graw Hill Education Private Limited, New Delhi, Reprint 2015.
   Unit – I: Section 4.3, 4.4, 4.7, 4.9, 4.10, 4.12, 4.13, 4.14, 4.21, 4.26
   Unit – II: Section 6.2, 6.3, 6.4, 6.9, 6.10, 6.12, 6.13
   Unit – III: Section 2.8, 2.9, 2.10, 2.11, 2.12
   Unit – IV: Section 9.2, 9.3, 9.4, 9.5, 9.6
   Unit – V: Section 13.2, 13.9, 13.10, 13.11, 13.15

2. Dr. K. D. Raju, Intellectual Property Rights and Competition Law, NPTEL, IIT Kharagpur. Unit – III: Section 1.1 – 6.1

**Books for Reference:**


1. K. Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Seventh Edition, Dhanpat Rai & Co. Pvt Ltd, New Delhi, 2004.
2. R. K. Rajput, Electrical and Electronics Measurements and Instrumentation, Fourth Edition, S. Chand & Company, New Delhi, 2016.
3. Intellectual Property Rights-Laws and Practices, The Institute of Company Secretaries of India, New Delhi 2019.
4.


**Web References:**

1. https://www.globalspec.com/learnmore/labware_test_measurement/multimeters_electrical_test_meters/analog_voltmeters
2. https://www.allaboutcircuits.com/textbook/experiments/chpt-2/voltage-usage/
3. https://www.electronics-notes.com/articles/test-methods/meters/analogue-multimeter.php
4. https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE3A | | ELECTRICAL AND ELECTRONIC iNSTRUMENTATION | | | | | | 2 | 2 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO2 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ |
| CO3 | ✔ | ✔ | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| CO4 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | ✔ | |
| CO5 | ✔ | ✔ | | ✔ | | | | | ✔ | |
| Number of matches = 38, Relationship : High | | | | | | | | | | |

Prepared by :
Dr. S. Shek Dhavud

Checked by
Dr. S. Shek Dhavud

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE3B | SEC – III | ELECTRICAL AND ELECTRONIC APPLIANCES | 2 | 2 | 100 | ---- | 100 |

**Course Outcomes:**

At the end of this course, students will be able to

1: understand the principles and operations of analog and digital instruments
2: study Signal Generators and Waveform analysis
3: learn the principle of transducers and their classifications
4: diagnose the problem of the mobile phone and understanding possible problem
5: understand the network problems and SIM card problems and to learn the trouble shooting process.

**Unit I : Audio and Video Equipments (6 Hours)**

Introduction – Gramaphone – Recording techniques - Magnetic tape – Tape recorder – Mono – Stereo – Spool type - Compact Disc – VCD, MP3, DVD, MP4, Blue Ray - Memory Card USB Home Theatre – Dolpy – **#**DTS**#**

**Unit II :Transceivers&Cell phone trouble shooting (6 Hours)**

Cell Phone – PCS, GSM, CDMA, TDMA Transmission - Infra red – Blue tooth, GPRS, Camera, VGA, Pixel type - Cell phone frequency –Chip Level Information of Mobile Phone-Soldering lead - Soldering paste -De- Soldering wire - Assembling &Disassembling of Smart Phones.-Charging problems - Battery Problems - Software Problems - Sim Card problems - Problems related to mobile phone- handsets - replacement of Various components ICS Satellite Phone

**Unit III : Medical Electronic Equipments (6 Hours)**

Introduction – Electronic blood testing equipment - ECG –MRI – Ultrascan - CT Scan and ultrasound - Electronic BP apparatus - Digital Thermometers – EEG - Digital X-Ray - **#**Nano technology and its applications**#**

**Unit IV: Winding of AC& DC machines (6 Hours)**

Single phase windings – Lap winding – wave winding – concentric winding – Three phase winding – single layer winding – double layer winding.

General procedure – Double Layer simplex Lap winding – Double layer duplex Lap winding – Double Layer simplex wave winding.

**Unit V : Testing of electric appliances (6 Hours)**

Ceiling & table fans – Exhaust Fan – General Fault and Remedy.Washing Machine –Semi and Fully Automatic – Top and Front loading –Problems and Remedies.Vacuum Cleaner-Repairing.
Washing technique – AC testing and trouble shootings -Voltage tester screwdriver – Continuing Test – Insulation test – Measurement ofPower for DC & AC Circuits.

**Book for Study:**

1. Basic Elctrical and Electronics engineering, S.K.Battacharya, PraesonPublications(2006).
2. Electrical Machinery, P.S.Bimphra, Krishna Publishers(2011).
3. Service Manual-Electrical Home Appliances-GT Publications
4. Jochen H. Schiller, Mobile Communications –Pearson, Second Edition, 2004,New Delhi

**Web References:**

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/275484/electricity_survey_2_tuning_in_to_energy_saving.pdf

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| V | 20UPH5SE3B | | ELECTRICAL AND ELECTRONIC APPLIANCES | | | | | | 2 | 2 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO2 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ |
| CO3 | ✔ | | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| CO4 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | |
| CO5 | ✔ | ✔ | | ✔ | | ✔ | | | ✔ | |
| Number of matches = 39, Relationship : High | | | | | | | | | | |

Prepared by :
Mr. A. Abbas Manthiri

Checked by :
Mr. A. Abbas Manthiri

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6CC13P1 | CORE – XIII | GENERAL PHYSICS AND SCIENTIFIC PROGRAMMING – PRACTICALS | 3 | 3 | 50 | 10 | 40 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Practice the determination of coefficient and measurement of physical quantities in optical, electricity and magnetic experiments.
2. Learn the practical skills essential for experimentation.
3. Familiarise themselves the concept of optical experiments.
4. Understand the theory and practical applications of numerical programming.
5. Acquire the basic concepts required for their higher studies.

**List of Experiments:**

1. *i-i' curve*: Determination of Refractive Index of Glass using a prism and a Spectrometer.
2. Self Inductance of a coil by Anderson's method.
3. Potentiometer: Calibration of a High Range Voltmeter.
4. **#Determination of Magnetic Susceptibility by Quincke's Method#**
5. **#Determination of q, n, σ by Hyperbolic fringes method#**
6. **#Determination of carrier concentration and Hall coefficients in semiconductors#**
7. Programming Exercises using Two-Dimensional Arrays
   - To accept the elements and print a two dimensional array.
   - Trace of a square matrix.
   - Transposing a square matrix.
   - Addition of two square matrices (n × n matrices)
8. Programming Exercises using Functions
   - To evaluate the factorial of a given number.
   - To find the sum of two numbers
   - To construct the Fibonacci series
9. Programming Exercises for Curve Fitting using Regression Analysis
   - To fit a given set of data to a straight line using linear least square fit.
   - To fit a given set of data to an exponential equation of the form $p = p_0\, e^{kt}$
10. Programming Exercises for Evaluation of some Statistical Parameters
    - Calculation of median of a given data set.
    - Calculation of mode of a given data set.

**# - New experiment introduced under DBT Star College scheme**

**Books for reference:**


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

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


**Web References:**

www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester** | **Code** | | | **Title of the Course** | | | | **Hours** | **Credits** |
|---|---|---|---|---|---|---|---|---|---|
| **VI** | **20UPH6CC13P1** | | | **GENERAL PHYSICS AND SCIENTIFIC PROGRAMMING – PRACTICALS** | | | | **3** | **3** |
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ |
| CO4 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ |
| Number of matches = 36 (ie.) 72 %, Relationship - High | | | | | | | | | | |

Prepared by
Dr. A. Ishaq Ahamed

Checked by
Dr. C. Hariharan

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6CC13P2 | CORE – XIII | DIGITAL ELECTRONICS AND MICROPROCESSOR – PRACTICALS | 3 | 2 | 50 | 10 | 40 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Develop the skills in analog experiments
2. Learn the applications of operational amplifier.
3. Gain a clear understanding of operations of electronic circuits..
4. Practice the assembly language programs of 8085 microprocessor using trainer kit.
5. Acquire the basic concepts required for their higher studies.

**List of Experiments:**

1. Verification of Logic Gates (AND, OR, NOT, NAND, NOR & EX-OR) and De Morgan's Theorems using ICs.
2. Full adder and Full subtractor using basic logic gates
3. Construction of Monostable Mulitivibrators using Op-Amp.
4. Simplification of Boolean expression using Karnaugh Map.
5. UJT characteristics.
6. Verification of the Truth Tables of R-S, Clocked R-S and J-K Flip-Flops.
7. Eight Bit Multiplication and Division using µp 8085.
8. Searching for the Biggest and Smallest Numbers of an Array using µp 8085.
9. Conversion of a Decimal Number to Hexadecimal form and vice versa using µp 8085.
10. FET characteristics.

**Books for References:**


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

**Web References:**
www.physicstutoruials.org
www.sciencelearn.org.nz

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

| **Semester** | **Code** | | | **Title of the Course** | | | | **Hours** | **Credits** |
|---|---|---|---|---|---|---|---|---|---|
| **VI** | **20UPH6CC13P2** | | | **DIGITAL ELECTRONICS AND MICROPROCESSOR – PRACTICALS** | | | | **3** | **2** |
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO2 | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO3 | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ |
| CO4 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ |
| Number of matches = 36 (ie.) 72 %, Relationship - High | | | | | | | | | | |

Prepared by
Mr. A. Mohamed Saleem

Checked by
Dr. A. Ishaq Ahamed

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6CC14 | CORE –XIV | WAVE MECHANICS | 5 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Acquire the basic principle of properties wave mechanics
2. Learn applications of the Schrodinger equation.
3. Practice Eigen value problems and matrix formulation.
4. Understand the theory and practical applications and laboratory skills of wave mechanics and to solve some quantum mechanical problems.
5. Learn the fundamental ideas for pursuing higher studies.

**UNIT – I: Inadequacy of Classical theory (15 Hours)**

Black body radiation – difficulties with classical theory of black body radiation – Planck's quantum theory – Planck's radiation formula- difficulties with classical theory of specific heat of solids – Einstein's theory of specific heat – the Frank-Hertz experiment – application of Wilson-Sommerfield: Quantization rule for the harmonic oscillator and its limitation.

**UNIT – II: Foundations of Wave Mechanics (15 Hours)**

Dual nature of matter – Matter waves(D'Broglie waves) –properties- **#**evidences of the existence of matter waves**#** – Davison and Germer's experiment – G.P. Thomson's experiment – velocity of D'-Broglie wave – Wave packet – Group velocity – Phase velocity –Relation between group velocity and phase velocity- Heisenberg's Uncertainty principle –Physical significances of uncertainty relation-non-existence of the electrons in the nucleus.– Mathematical proof of uncertainty principle for one dimensional wave packet

**UNIT – III: Formulation of Wave Mechanics (15 Hours)**

Operators – Basic definitions – Operators associated with dynamical variables-orthonormal functions – Eigen functions and Eigen values – Hermitian operator – Properties of Hermitian operator-Postulates of Quantum mechanics – Measurability of observables – Superposition state and probability – Expansion theorem – Ehrenfest's theorem.

**UNIT – IV: Schrödinger's Wave Equation (15 Hours)**

Equation of motion of matter wave – time independent Schrodinger equation – Schrödinger equation for a free particle – time dependent Schrödinger equation – physical interpretation of wave function – solution of Schrödinger equation – **#**stationary states**#** – expectation values of dynamical quantities – Probability current density.

**Unit – V: Physical applications of 1-D Schrodinger applications (15 Hours)**

Schrodinger equation for the particle in a one-dimensional box (infinite potential well)- Potential step - The Barrier penetration problem - Density states -Eigen values and Eigen functions of the one-dimensional linear harmonic oscillator – significance of zero point energy- Comparison of classical probability density and Quantum mechanical probability density.

**Text books:**

1. Sathya Prakash and G.K. Singh, Quantum Mechanics, First edition, Kedar Nath Ram Nath & Co,1991

| | | |
|---|---|---|
| UNIT I | Chapter 1 | Sections 1.3 - 1.14 |
| UNIT II | Chapter 2 & 4 | Sections 2.2 - 2.10 & 4.1 - 4.4 |
| UNIT IV | Chapter 2 | Sections 2.12 - 2.18 |
| UNIT V | Chapter 5 | Sections 5.1 - 5.5 , 5.9 |

2. G. Aruldhas and P. Rajagopal, Modern Physics, Second edition, Prentice Hall of India, 2005.

| | | |
|---|---|---|
| UNIT III | Chapter 5 | Sections 5.1 - 5.9 |

**Books for Reference:**

1.R. Murugesan, Modern physics, S.Chand & Company Ltd, 4th edition, 2005
2.G. Aruldhas, Classical Mechanics, Second edition, Prentice Hall of India,2008

**Web References:**

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

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

| Semester | Code | Title of the Course | Hours | Credits |
|---|---|---|---|---|
| VI | 20UPH6CC14 | WAVE MECHANICS | 5 | 5 |

| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO2 | ✔ | ✔ | | ✔ | | ✔ | ✔ | | ✔ | ✔ |
| CO3 | ✔ | | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| CO4 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | ✔ | |
| CO5 | ✔ | ✔ | | ✔ | | | | ✔ | ✔ | |

Number of matches = 37, Relationship : High

Prepared by :
Dr. S. Abbas Manthiri

Checked by :
Dr. R. Radha Krishnan

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6CC15 | CORE – X | NUCLEAR PHYSICS | 5 | 5 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1: acquire the knowledge of fundamentals of nuclear properties and apply the concepts to calculate various parameters of nucleus.

2: understood the theoretical concepts of various nuclear models.

3: analyze the working of nuclear reactors and their application *in daily life.*

4: able to perform quantitative calculations involving nuclear power.

5: able to demonstrate the effect of nuclear radiation.

**Unit – I Nuclear Structure and Models (15 Hours)**

Classification of nuclei – properties of nucleus: nuclear size –**#** nuclear mass**#** – nuclear density – charge – spin – dipole moment – quadrupole moment - Binding energy – nuclear stability – mass defect and packing fraction – nuclear forces – Meson theory of nuclear forces – liquid drop model - Shell model – Collective model.

**Unit – II Radioactivity and Radiations (15 Hours)**

Radioactivity - Properties of α, β and γ rays – Soddy Fajan's law – Radioactive law of distintegration – half life period – mean life period – law of successive disintegration – radioactive dating – age of the earth – Radiocarbon dating – Biological effects of nuclear radiations.

Range of α particles (Definition) – Bragg's experiment to determine range of α-particle – Geiger-Nuttal law and experiment– Beta ray spectra – origin of line and continuous spectra – neutrino theory of beta decay - K-electron capture – Origin of γ ray –Nuclear isomerism – **#**Internal conversion**#**.

**Unit – III Particle accelerators and Detectors (15 Hours)**

Cockcroft Walton voltage multiplier – **#**Vande Graff generator**#** - Linear accelerator – cyclotron – synchrocyclotron – Betatron – Proton synchrotron.

Ionisation chamber – Proportional counter - G.M. Counter –Wilson cloud chamber – Bubble chamber - Cerenkov counter.

**Unit – IV Nuclear fission, Fusion and radiation hazards (15 Hours)**

Nuclear Fission – energy released in fission – Bohr Wheeler's theory of fission -chain reaction – nuclear reactor – PWR – BWR – Fast breeder reactor – Nuclear Fusion – sources of stellar energy – thermonuclear reaction – controlled thermonuclear reactions.

Radiation hazards – radiation levels for safety –protection methods – **#**nuclear disasters – nuclear waste disposal**#**

**Unit – V Nuclear Reactions and elementary particles (15 Hours)**

Bohr's theory of Nuclear reactions – Q value - types of nuclear reactions – energy balance in nuclear reactions - transmutation by alpha particle, proton and neutron.

Classification of elementary particles – **#**particles and antiparticles**#** – fundamental interactions – quantum numbers – conservation laws and symmetry – quark model.

**#.....# self-study portion**

**Text Books:**

1. R Modern Physics – R. Murugesan, KiruthigaSivaprasath, S.Chand& Company Ltd, New Delhi., 2006

| Units | Chapter |
|---|---|
| Unit – I | 27.1 – 27.5, 27.7 – 27.12 |
| Unit – II | 31.1 – 31.6, 31.10, 31.19, 31.21 – 31.23, 31.25 – 31.27 |
| Unit – III | 30.1 – 30.7, 30.9, 29.3, 29.5 – 29.7, 29.9, 29.13 |
| Unit – IV | 35.1 – 35.4, 35.6 – 35.9, 36.1 – 36.3, 32.1 – 32.5 |
| Unit – V | 34.2 – 34.5, 34.7, 38.1- 38.7 |

**Books for references:**

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

**Web Reference:**

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

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6CC15 | | NUCLEAR PHYSICS | | | | | | 5 | 5 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO2 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ |
| CO3 | ✔ | | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| CO4 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | ✔ | |
| CO5 | ✔ | ✔ | | ✔ | | | ✔ | | ✔ | |
| Number of matches = 37, Relationship : High | | | | | | | | | | |

Prepared by :
Dr.N.Peer Mohamed Sathik

Checked by :
Dr.C.Hariharan

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6CC16 | CORE-XVI | LASER AND MEDICAL PHYSICS | 4 | 5 | 100 | 25 | 75 |

**Course Outcome:**

At the end of this course, students will be able to

1: study the basic concept of Laser and pumping mechanism.

2: learn the working principle of different types of Lasers, holography and their applications.

3: apply the principle of Laser intended for use in surgery and treatment.

4: acquire the awareness of radiation exposure using ionizing radiation during treatment.

5: understand the working mechanism of advanced instrumentation to use in diagnosis.

**Unit – I Fundamentals of Lasers (12 Hours)**

Introduction – Principles of laser – Difference between laser and ordinary light – Einstein prediction for stimulated emission – Three Process: Absorption, Spontaneous and stimulated emission – Population inversion – Pumping methods: Optical, and Electrical pumping – Metastable states – pumping schemes: Two level and three level pumping schemes.

**Unit – II Lasers and Applications (12 Hours)**

Introduction – Classifications of Lasers: Solid state, Liquid, and Gas lasers – Mechanism and productions of lasers: Ruby Laser, Helium-Neon Laser, and Tunable Dye Lasers – Holography – Construction of hologram – Reconstruction of hologram – Advantages and applications

**Unit – III Laser in Medicine and Surgery (12 Hours)**

Laser in Medicine and surgery – #Eye laser surgery# – Photocoagulations – Skin conditioning using Er-YAG – Laser applications in dentistry – Laser Angioplasty – Different laser therapies – Laser Endoscopy

**Unit – IV Radiation in Medicine (12 Hours)**

Introduction – Radiation safety instrumentation – Units of Radiation: One curie – One Roentgen – One rad – One rem – Effects of radiation exposure – Radiation protection: #Stochastic effects – non stochastic effects# – Radiation monitoring instruments: Pocket dosimeters – Film dosimeter – Thermoluminescence dosimeter (TLD)

**Unit –V Advances in biomedical Instrumentation (12 Hours)**

#Digital thermometer# – Nuclear Imaging techniques: Gamma ray camera – Computer tomography (CT): Principle – working function of CT scanner – Applications of CT – Positron emission tomography (PET)

# **Self study** #

**Text Books:**

| Units | Title of the Book | Section Number | Page No. |
|---|---|---|---|
| **Unit – I** | An introduction to LASERS Theory and Applications Dr. M.N. Avadhanulu & Dr. P.S. Hemne S. Chand & Company Ltd., New Delhi Second Revised Edition, 2012. | 1.1, 1.2, 1.19, 1.20, 1.27, 1.29, 1.30, 1.31, 1.32 (a) & 1.32 (b) | 1, 2, 31, 32, 33, 44 – 48 |
| **Unit – II** | | 2.1,2.2,2.3,2.3.1,2.4 2.4.1,2.5 | 80–84, 88–89, 90-92, 100, 101 |
| **Unit – IIII** | | 5.6, 5.7, 5.8, 5.9.2.2, 5.11, 5.12, 5.13, 5.14, | 163 – 166, 172, 173, 174–176 |
| **Unit – IV** | **Biomedical Instrumentation Dr. M. Arumugam** Second Edition, Reprint-2010, Anuradha Publications PVT, Kumbakonam, 2010. | 9.1, 9.2, 9.2.1, 9.2.1, 9.2.2.(i), 9.2.(iii), 9.2 (iv) | 322 – 328 |
| **Unit – V** | | 7.6, 10.6, 10.7, 10.10, 10.10.(i,ii,iii), 10.11 | 290–292, 358, 359, 360 –366, 400 –401 |

**Books for Reference:**


1. Laser theory and applications – K. Thyagarajan and A.K. Ghatak, Macmillan India Ltd., I$^{st}$ Edn, New Delhi, 1999.
2. Physics for Engineering, P.K. Palanisamy, Scitech Publishing Pvt. Ltd., Chennai


**Web References:**

**Stochastic effects – Non stochastic effects:**
https://www.env.go.jp/en/chemi/rhm/basic-info/1st/03-01-04.html

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

**Digital thermometer:**
https://www.tegam.com/how-does-a-digital-thermometer-work/

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

| Semester | Code | Title of the Course | | | | | Hours | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6CC16 | LASER AND MEDICAL PHYSICS | | | | | 4 | | | | 5 |
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| **CO2** | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | ✓ | ✓ |
| **CO3** | ✓ | | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ |
| **CO4** | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| **CO5** | ✓ | ✓ | | ✓ | | | ✓ | | | ✓ | |
| Number of matches = 39, Relationship : High | | | | | | | | | | | |

Prepared by :
Dr. J. Ebenezar

Checked by :
Dr. J. Ebenezar

**Note:**

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6DE2A | DSE – II | DIGITAL ELECTRONICS AND MICROPROCESSOR | 5 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

1: understand the principles and operations of analog and digital instruments
2: understand the digital principles and its applications
3: learn the principle of combinational and Flip-flops.
4: study about the architecture of Intel 8085 Microprocessor
5: study about the instructions of Intel 8085 its programming.

**Unit – I Logic Gates and Logic Circuits (15 Hours)**

Basic Logic Gates, NOT, OR, AND - Logic Gates Circuits and Logic Expressions – Sum of Products (SOP) – Product of Sums (POS) – NAND and NOR Gates Ex-OR and Ex-NOR Gates – Positive and Negative Logic – Laws of Boolean algebra – De-Morgan's theorems – NAND as Universal Gate – NOR as Universal Gate – NOR-NOR Network

**Unit – II Karnaugh Map and Combination Circuits (15 Hours)**

Minterms – Relation Between K Map and Truth Table – 2- variable, 3- variable and 4-variable K Map using minterms - Don't care conditions - Maxterms – K map using maxterms – Half adder and Full adder – Half subtrator and Full subtractor – Multiplexer(2-input) – Demultiplexer – Decoder – Encoder

**Unit – III : Flip-flops (15 Hours)**

NAND Latch – SR Flip-flop – D Flip-flop – JK Flip-flop – JK Master-Slave Flip-flop – T Flip-flop – Registers – Shift Register – Ring Counter

**UNIT – IV: Microprocessor 8085 and instruction set of Intel 8085 (15 Hours)**

Microprocessor Architecture INTEL 8085 – Pin configuration – Opcode and operands – Instruction word size – Instruction cycle.

Addressing modes – Intel 8085 instructions – Data Transfer Group – Arithmetic Group – Logical group – Branch group – Stack, I/O and machine control group.

**UNIT – V: Assembly Language Programming and Interfacing (15 Hours)**

Addition of two 16-bit numbers – The largest number in data array – Ascending order – Descending order – Square root of a number – move a block of data from one section of memory to another section of memory.

Memory mapped I/O and I/O mapped I/O schemes – memory and I/O interfacing – Intel 8255 – Clock for AD convertor – Interfacing of ADC 0800 (Program for single DC input voltage) – DAC 0800.

**Books for Study:**

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

   Unit-I : Chapter: 4.3 – 4.9, 5.1 – 5.6.

   Unit-II : Chapter: 6.1 – 6.8, 7.2, 7.5, 8.1 – 8.4.

   Unit-III: Chapter: 9.2 – 9.6, 10.1 – 10.3.

2. B. Ram, Fundamentals Microprocessors and Microcontrollers, Dhanpat Rai Publications (P) Ltd, 8th Edition, Reprint 2016

   Unit-IV : Chapter: 3.1, 3.1.1 – 3.1.3, 3.1.5, 3.1.7, 3.1.8, 3.2, 4.3, 4.3, 4.6.1 – 4.6.5

   Unit-V : Chapter: 6.7, 6.21, 6.22.1, 6.36, 6.37, 7.2.1, 7.2.2, 7.3.1, 7.3.2, 7.7.1 – 7.7.4, 8.3, 8.6.1, 8.12.2.

**Book for Reference:**

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

**Online Resources:**

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

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6DE2A | | DIGITAL ELECTRONICS AND MICROPROCESSOR | | | | | | 5 | 4 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO2 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ |
| CO3 | ✔ | | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| CO4 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | |
| CO5 | ✔ | ✔ | | ✔ | | ✔ | | | ✔ | |
| Number of matches = 39, Relationship : High | | | | | | | | | | |

Prepared by :
Dr. R. Raj Muhamed

Checked by :
Mr. A. Mohamed Saleem

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6DE2B | DSE -II | MATERIALS SCIENCE | 5 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Basic concepts of crystallography such as crystal lattices
2. Learn structures of crystals and their imperfection
3. Electron theory of solids, distinction between metals, insulators and semi conductors
4. Properties of Dielectric and Magnetic materials
5. Mechanical behavior of materials

**Unit – I: Crystallography (15Hours)**

Classification of solids, crystals and non-crystalline materials – lattice points – space lattice – unit cell – Bravais lattices – Miller Indices – symmetry elements of a crystalline solid – crystal structures of Face Centred Cubic –Zinc blender or cubic structure – sodium chloride

**Unit – II: Simple crystal structures and imperfections (15 Hours)**

X-ray diffraction and Bragg's law – simple crystal structures – Laue method – powder method – Effect of crystal imperfections –Crystal growth–Crystal growth from solutions– Crystal growth from melt.

**Unit –III:Electron theory of solids (15 Hours)**

The classical free electron theory – Electron energies in metal and Fermi energy –Explanation of covalent bonding in crystal– distinction between metals, insulators and semi conductors – Hall effect – Hall coefficients –Quantum mechanical tunneling in solids–#Tunnel diodes#

**UNIT – IV: Dielectric and Magnetic materials (15 hours)**

Fundamental definitions in dielectrics – Frequency and temperature effect on polarisation –Dielectric loss–Dielectric breakdown–Clausius – Mosatti relation.

**UNIT – V: Testing of materials (15 hours)**

Destructive tests – Tensile test – Viker's Hardness test – Non Destructive tests – X ray radio graphic technique - # Comparison between X ray radiography and gamma ray radiography # - Ultrasonic method of NDT – advantages and disadvantages of ultrasonic testing.

**#.....# self-study portion**

**Text Books:**

1.Material Science – M.Arumugam, 3rd edition, 2002, ANEH editiom
Unit – I: Section :Chapter-3:3.1,3.2, 3.5,3.6,3.7.
Unit– II: Section :Chapter-3:3.8, 3.9.5, 3.9.6.
Unit – III: Section:Chapter-4: 4.2, 4.3, 4.6, 4.10, 4.12, 4.15.
Unit – IV: Section :Chapter-6: 6.2, 6.4, 6.5, 6.7, 6.9.
Unit – V: Section : Chapter-12: 12.29, 12.35, 12.42, 12.43, 12.45, 12.46
2. Materials science engineering – V. Raghavan, PHI

**Books for Reference:**

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

**Web References:**

1. www.physicstutoruials.org
2. www.sciencelearn.org.nz
3. https://classcentral.com/course/swayam_material science_7927

Indian Institutes of Technology Kanpur and NPTEL via Swayam.

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6DE2B | | MATERIALS SCIENCE | | | | | | 5 | 4 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | | ✔ | ✔ |
| CO2 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | ✔ | | ✔ |
| CO3 | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | | ✔ |
| CO4 | ✔ | | | ✔ | | | | ✔ | ✔ | ✔ |
| CO5 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | |
| Number of matches = 37, Relationship : High | | | | | | | | | | |

Prepared by :

Mrs. J.SABNA ASHMI

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6DE3A | DSE – III | NON CONVENTIONAL ENERGY PHYSICS | 4 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1. Acquire the basic concepts of solar radiation and the principle of solar radiation measuring instruments.
2. Learn the practical applications and laboratory skills.
3. Awareness about energy resources and technologies.
4. Understand the theory and practical applications of various energies in day to day life.
5. Recognize current and possible future role of non-conventional energy resources.

**Unit – I: Energy Resources and the Sun (12 Hours)**

Conventional and Non-Conventional energy resources – Environmental consequence of fossil fuels use-Importance and types of Non-Conventional source of energy. The Sun as source of energy-RadiationSpectrum-#Extraterrestrial and terrestrial radiations#-Spectral power distribution-measurement of solar radiation-Pyranometer-Pyrheliometer.

**Unit – II: Solar Thermal and PV Systems (12 Hours)**

Solar water heater-Box type solar cooker-Solar Furnace-Solar Dryer-Solar Distillation. Principle and working of Solar Cell-#Solar Module and Array#-Solar Module Characteristics-Solar PV system and their components-Design and study of Solar Lantern-PV system for home lightings and fans (including case studies).

**Unit –III: Biomass Energy (12 Hours)**

Introduction-Photosynthesis Process-Usable forms of Biomass-Composition and fuel properties-#Biomass Resources#- Biomass conversion technologies-Operational parameters of Biogas plant-MSW Incineration Plant-Floating drum and fixed dome Biogas plants and their comparison-Jwala Biogas model-Deenbandhu Biogas model.

**UNIT – IV Wind Energy (12 hours)**

Origin of winds-Power in wind-Capacity Factor-Power extraction from wind-Wind turbine types and construction-Horizontal axis wind turbine (HAWT)-Vertical Axis Wind Turbine (VAWT)-Wind energy conversion system (WECS)-fixed and variable speed scheme.

**UNIT – V Ocean Energy (12 hours)**

Origin and nature of Tidal Energy-Tidal energy technology-Tidal range power-Ocean Tidal energy conversion schemes-single basin-single and double effect scheme. Wave energy-Power in waves-Ocean thermal Energy-origin and characteristics of resource-Ocean Thermal Energy Conversion (OTEC).

**#.....# self-study portion**

**Text Books:**

1. B.H. Khan., Non-Conventional Energy Resources, McGraw-Hill Education, Third Edition
   Unit – I: Section 1.15.2,1.10,4.2,4.4,4.6,4.8,4.8.1,4.8.2.
   Unit – II: Section 5.3,5.7,5.8,5.10,5.11,6.6.1,6.3.
   Unit – III: Section 8.1,8.2,8.3,8.4,8.5,8.6,8.10.5,8.10.7,8.10.10(4&8).
   Unit-IV: Section 7.2,7.3.3,7.3.4,7.7.1,7.8,7.8.1,7.8.2,7.9.
   Unit-V: Section 10.2.1,10.2.3,10.3,10.3.1,10.4,10.4.1,10.4.2.
2. Renewable Energy Technologies, A Practical Guide for Beginners, Chetan Singh Solanki, PHI.
   Unit – II: Section 3.4,3.5,3.6.

**Books for Reference:**

1. Solar Energy Utilization- G.D.Rai,Khanna Publishers.

**Web References:**

1. www.edfenergy.com
2. www.makai.com
3. https://onlinecourses.nptel.ac.in/noc20_ge06/preview

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

| Semester | Code | | Title of the Course | | | | | | Hours | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6DE3A | | NON-CONVENTIONAL ENERGY PHYSICS | | | | | | 4 | 4 |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO2 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ |
| CO3 | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ |
| CO4 | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | | |
| CO5 | ✔ | ✔ | | ✔ | | | | ✔ | ✔ | |
| Number of matches = 37, Relationship :High | | | | | | | | | | |

Prepared by :
Mr. S. M. I. Sulaiman Sait

Checked by :
Dr. M. Jamal Mohamed Jaffar

Note:

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

| Semester | Code | Course | Title of the Course | Hours | Credits | Max. Marks | Internal Marks | External Marks |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6DE3B | DSE – III | ASTROPHYSICS | 4 | 4 | 100 | 25 | 75 |

**Course Outcomes:**

At the end of this course, students will be able to

1: understand the principles galaxy systems.
2: impart an understanding of the great number of diverse phenomena in the universe through Physics
3: understand the solar system
4: understand the life in universe
5: learn the solar systems

**UNIT - I: ELEMENTS OF SPACE DYNAMICS (12 Hours)**

Man's quest for space - the energy requirements - Rocket propulsion -suborbital flights - **#**Artificial earth satellites**#** - Lunar and planetary probes.

**UNIT- II: THE HEART OF THE SOLAR SYSTEM (12 Hours)**

Vital statistics of the Sun - the solar photosphere - the Fraunhoffer lines - structure of solar atmosphere - the solar interior - Sunspots and solar activity - **#**other features of the solar activity**#** - Radio studies of the quiet Sun – Radio radiation of the disturbed Sun.

**UNIT - III : SMALL BODIES IN THE SOLAR SYSTEM (12 Hours)**

Asteroids - Meteorites - Comets as members of the Solar system – Physical properties of comets - Origin and evolution of comets - Space studies of comets - Meteors - an inventory of satellites - the large satellites - Medium, small and tiny satellites - Planetary rings.

**UNIT - IV : OUR HOME AND THE NEAREST NEIGHBOUR (12 Hours)**

EARTH: Gross properties - internal structure - the terrestrial atmosphere - the Earth's magnetic field - motions - Solar terrestrial relations - the Earth in space - atmospheric circulation in the troposphere. MOON: Some basic facts - telescopic studies - internal structure - surface features - Origin of the Moon - the lunar environment - Solar and Lunar eclipses.

**UNIT - V: LIFE IN THE UNIVERSE (12 Hours)**

Nature of life on Earth - A survey of objects in the Solar System - Pre Mariner search for life on Mars - Post-Mariner search for life on Mars - Life outside the Solar system - **#**the search for life in the Universe**#**.

**Book for Study**

1. Astrophysics of the Solar System - KD Abhyankar, Universities Press India Pvt. Ltd. Hyderabad, 1999.

Unit I : 3.1 –3.6
Unit II: 4.1 – 4.10
Unit III: 9.1 – 9.11
Unit IV: 5.1 –5.9, 6.1–6.6
Unit V: 11.1 – 11.7

**Web Resources:**

1. https://www.space.com/26218-astrophysics.html
2. https://www.tcd.ie/Physics/people/Peter.Gallagher/lectures/JFAstronomy/Lecture1_Introduction.pdf
3. http://www.iucaa.in/~dipankar/gradschool2013/Home_files/AAIntro1-Lectures-2013.pdf

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

| **Semester** | **Code** | | **Title of the Course** | | | | | | **Hours** | **Credits** |
|---|---|---|---|---|---|---|---|---|---|---|
| **VI** | **20UPH6DE3B** | | **ASTROPHYSICS** | | | | | | **4** | **4** |
| **Course Outcomes (COs)** | **Programme Outcomes (POs)** | | | | | **Programme Specific Outcomes (PSOs)** | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** |
| **CO1** | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| **CO2** | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | | ✔ | ✔ |
| **CO3** | ✔ | | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| **CO4** | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | |
| **CO5** | ✔ | ✔ | | ✔ | | ✔ | | | ✔ | |
| Number of matches = 39, Relationship : High | | | | | | | | | | |

Prepared by :
Dr. N. Peer Mohamed Sathik

Checked by :
Dr. N. Peer Mohamed Sathik

Note:

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

| SEMESTER | CODE | COURSE | TITLE COURSE | HOURS | CREDITS | MAX. MARKS | INTERNAL MARKS | EXTERNAL MARKS |
|---|---|---|---|---|---|---|---|---|
| VI | 20UPH6EC2 | EC - II | PHYSICS FOR COMPETITIVE EXAMINATION | --- | 4* | 100* | --- | 100* |

**Course Outcomes:**

At the end of this course, students will be able to

1. Develop the skills and quantitative knowledge in physics concepts to face the competitive examination
2. Understand the core concept of Physics subjects
3. Acquired the basic concepts required for their higher studies
4. Prepare the students to pursue research careers, careers in academics, in industries in Physical science and in allied fields.
5. Take up competitive exams and Trained to take up jobs in allied fields.

**Unit – I: Mechanics and sound**

Motion of particles under various type of forces -Simple Harmonic motion -Elastic constants-Fluid Motion- Gravitation- Friction- Rockets- Satellites- Waves (Progressive and stationary) -Superposition of waves - Transverse and longitudinal waves -Interference of sound waves- Intensity of sound - Velocity of sound- Beats-Doppler effect- Stationary Waves.

**Unit – II: Heat and Thermodynamics**

Heat Transfer mechanism- Mean free path- Molar Specific heats- Equation of state for ideal gases- Graphical representation of reversible and irreversible process -Thermodynamic Potentials- Entropy - Black body - Stefan's law - Wien's Displacement law - Newton's law of cooling

**Unit – III: Electromagnetism**

Magnetic lines of force - Magnetic induction- earth as a magnet - Magnetic Properties of Dia , Para, Ferro – deflection and vibration magnetometer- Fields of Solenoids & Toroid's-Electric lines of forces- Electric intensity -Electric potential - Ohm's law - Specific Resistance - Measurement of resistance: Wheatstone bridge, Potentiometer- Fleming rule -Self and Mutual Induction- AC and DC circuits- Transformers.

**Unit – IV: Optics & Spectroscopy**

Reflection and refraction from plane and spherical surfaces critical angle –Total internal reflection-Lenses and prism-Combinations of Mirrors and thin lenses-Power of lenses- Aberrations -Dispersion - Polarisation - Diffraction - Huygens's principle - Simple Optical instruments: Telescope, Microscope- Spectrometer, Photometry- Velocity of light -Interference of light -Electromagnetic Spectrum- Laser

**Unit – V: Modern Physics**

X-rays - Photoelectric effect – Wave particle duality - Uncertainty principle -Bohr's theory of Hydrogen atom - Spectral Series of Hydrogen atom- Semiconductors–Multivibrators - Amplifiers - Register's - CRO - Integrated circuits - Structure and Properties of Nucleus - Radioactivity - Nuclear Reactor- Nuclear Models- Baryons, Leptons - Postulates of Special Theory of Relativity.

**Book for Study**

**1.** The Treaties on Physics for IIT-JEE, 1999 Edition – K.V. Ramakrishna Sastry,Vikas publishing house PVT Ltd – New Delhi.

2. Objective Physics for IIT-JEE – Volume II- 12$^{TH}$ Edition- DR .PramodAgarwal, GR. Bhatilapublishing house PVT Ltd – New Delhi

3. Concepts of Physics –Part 1- DR. HC VERMA –BharatiBhawanpublishing house PVT Ltd – New Delhi

**Web References:**

www.physicstutoruials.org
www.sciencelearn.org.nz
https://physicscatalyst.com/chapter.php
https://nptel.ac.in/courses/115/103/115103101/
https://youtu.be/lTp9QC-cy9Y
Indian Institutes of Technology- Delhi and NPTEL via Swayam.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes**:**

| **SEMESTER** | **CODE** | | **TITLE OF THE PAPER** | | | **HOURS** | | | | **CREDIT** |
|---|---|---|---|---|---|---|---|---|---|---|
| **VI** | **20UPH6EC2** | | **PHYSICS FOR COMPETITIVE EXAMINATION** | | | **----** | | | | **4*** |
| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | Programme Specific Outcomes (PSOs) | | | | |
| | PO 1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO2 | ✔ | ✔ | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ |
| CO3 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | | ✔ | |
| CO4 | ✔ | | ✔ | ✔ | | | | ✔ | ✔ | |
| CO5 | ✔ | ✔ | | | | ✔ | ✔ | | | ✔ |
| Number of Matches = 35, Relationship : HIGH | | | | | | | | | | |

**Prepared by:**
**Miss. R.GOWTHAR**

**Note:**

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