STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600 086

B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

PROPERTIES OF MATTER AND ATOMIC PHYSICS

CODE : 15PH/MC/PA14 **CREDITS : 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To develop in students a theoretical understanding of properties of matter
- To enable the students to understand the fundamental concepts of atomic physics and its application in various fields

Unit 1 (10 hrs.)

Elasticity

1.1 Elasticity - Introduction - Bending of Beams - Expression for the Bending Moment – Depression of the Loaded End of a Cantilever - Expression for Depression at the Midpoint of a Beam Loaded at the Centre (Non-Uniform Bending) Experiment to Determine Young's Modulus 'E'- Expression for Elevation at the Centre of a Beam (Uniform Bending) - Experiment to Determine 'E'

1.2 Torsion-Expression for Torque Per Unit Twist-Work Done in Twisting a Wire-Torsional Oscillation of a Body - Expression for Time Period of Torsional Oscillation- Experiment to Determine Rigidity Modulus 'N'

Unit 2 (10 hrs.)

Surface Tension

2.1 Surface Tension - Explanation of Surface Tension on the Basis of Kinetic Theory - Work Done in Increasing the Surface Area - Angle of Contact

2.2 Excess of Pressure Inside a Curved Liquid Surface - Formation of Clouds, Variation of Surface Tension with Temperature - Quincke's Drop

Unit 3 (10 hrs.)

Viscosity and Low Pressure

3.1 Viscosity - Coefficient of Viscosity - Newton's Law - Stream Line Flow- Turbulent Flow - Critical Velocity - Reynold's Number - Euler's Equation

3.2 Poiseuilles Flow - Absolute Determination of Viscosity - Comparison of Viscosities - Stoke's Law - Ostwald Viscometer - Variation of Viscosity with Temperature

Unit 4 **(12 hrs.)**

Positive Rays and Photoelectric Effect

4.1 Positive Rays- Aston's Mass Spectrograph

4.2 Photoelectric Effect : Introduction-Photoelectric Laws-Laws of Photoelectric Effect - Einstein's Photoelectric Equation - Experimental Verification of Einstein's Photoelectric Equation - Photoelectric Cells

4.3 Production of X-Rays-Bragg's Law - Bragg's Spectrometer - X-Ray Spectra-Continuous and Characteristic X-Ray Spectrum - Moseley's Law - Compton Effect-Experimental Verification

Unit 5 **(10 hrs.)**

Atom Model

5.1. Introduction to Atom Model - Vector Atom Model - Spatial Quantization - Spin Quantum Number Associated with Vector Atom Model - Shell Character-Electronic Structure-Electronic Configuration-Experimental Confirmation of the Vector Atom Model- Stern- Gerlach's Experiment - Bohr Magneton

5.2. Zeeman Effect-Experimental Arrangement of the Normal Zeeman Effect-Expression for the Zeeman Shift - Paschen Back Effect-Stark Effect

TEXT BOOKS

Arthur Beiser. *Concepts of Modern Physics.* New Delhi: Tata Mc Graw Hill, 2004.

Mathur, D.S. *Elements of Properties of Matter*. New Delhi: Shyamlal Charitable Trust, 1993.

Murugesan.R. *Properties of Matter*. New Delhi: S Chand, 2012.

Murugesan.R. *Modern Physics.* New Delhi: S Chand, 2013.

BOOKS FOR REFERENCE

Halliday, David. Robert Resnick and Jearl Walker. *Fundamentals of Physics.* Kundhi: John Wiley, Replica, 2001.

Rajam.J.B. *Atomic Physics*. New Delhi: S Chand, 2000.

Young Hugh D. Freedman Roger A. *University Physics.* New Delhi: Addison Wesley Longman, 1998.

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 mins

Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Seminar
Quiz
Open book tests
Assignment
Problem solving
.
End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

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B.Sc. PHYSICS: BRANCH III – PHYSICS

SYLLABUS
(Effective from the Academic year 2015-2016)

EXPERIMENTAL PHYSICS – I

CODE: 15PH/MC/P112 **CREDITS : 2**
L T P : 0 0 3
TOTAL HOURS : 39

1. Compound Pendulum
2. Young's Modulus - Pin and Microscope – Non-Uniform Bending.
3. Young's Modulus - Uniform Bending – Scale and Telescope
4. Surface Tension- Drop Weight Method.
5. Rigidity Modulus 'G' using Torsion Pendulum with Weights.
6. Lee's Disc – Thermal Conductivity of a Bad Conductor.
7. Spectrometer – Determination of the Refractive Index of the Material of Solid and Liquid Prism.
8. B.G. Figure of Merit- Current Sensitivity.
9. Zener Diode V-I characteristics

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan, *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks: 50 Duration: 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks: 50 Duration: 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

PSTELLA MARIS COLLEGE (AUTONOMOUS), CHENAI-600 086

B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

ELECTRONICS - I

CODE:15PH/MC/EL14 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To understand the concept of digital principles as applied to microprocessors and computers
- To develop knowledge in combinational logic and sequential logic circuits and their applications

Unit 1 **(10 hrs.)**

Number Systems and Binary Concept

1.1 Introduction – Analog and Digital Signals – Digital Circuit - Decimal- Binary - Octal and Hexa Number Systems

1.2 Binary Arithmetic – Principles of Addition –Subtraction- 1s Complement and 2s Complement Method - Multiplication and Division

Unit 2 **(12 hrs.)**

Boolean Algebra, Digital Arithmetic Circuits and K-map

2.1 Morgan's Theorem - Implementation of Boolean Algebra Into Circuits Half Adder – Full Adder – Half Subtractor – Full Subtractor - Parallel Binary Adder

2.2 Fundamental Products – SOP and POS Forms - Karnaugh Map - Simplification up to four Variables (SOP Only)-Don't Care Conditions - Realization of Logic Circuits

Unit 3 **(12 hrs.)**

Flip - Flops, Registers and Counters

3.1 Flip-Flops : RS - Clocked RS – D-T - JK and Master Slave Flip-Flops and Their Truth Tables

3.2 Registers and Counters: Shift Registers – Right Shift - Left Shift Registers - Binary Ripple Counter - Decade Counter

Unit 4 **(8 hrs.)**

Integrated Circuits – Fabrication and Characteristics

4.1 Integrated Circuit Technology: Scale of Integration –SSI, MSI, LSI, BLSI. Basic Monolithic Integrated Circuits – Fabrication Process-Epitaxial Growth – Masking and Etching - Diffusion of Impurities

4.2 Transistors for Monolithic Circuits – Monolithic Diodes – Integrated Resistors - and Capacitors

Unit 5 (10 hrs.)

Special Purpose Diodes

5.1 Introduction - Light Emitting Diode (LED) – LED Voltage and Current- Advantages.

5.2. Multicolor Leds - Applications –Power Indicator –Seven Segment Display- Photo Diode – Operation- Characteristics and Applications

TEXT BOOKS

Malvino Albert Paul. *Electronic Principles***.** New Delhi: Tata McGraw Hill, 1984.

Malvino Albert Paul and Leach Donald. *Digital Principles and Application.* New Delhi: Tata McGraw Hill, 1981.

Mehta V.K. *Electronic Principles*. New Delhi: S Chand, 2014.

BOOKS FOR REFERENCE

Allen Mottershead. *Electronic Devices and Circuits.* New Delhi: Prentice Hall of India, 1982.

Ambrose A and T. Vincent Devaraj. *Elements of Solid State Electronics***.** New Delhi: Meera, 1990.

Floyd Thomas L. *Digital Fundamentals.* New Delhi : Universal Book Stall, 1997.

Milmann and Halkias. *Integrated Electronics*. New Delhi: Tata McGraw Hill, 1992.

Sedha R.S. *Applied Electronics.* New Delhi: S Chand, 1997.

JOURNALS

AEU - International Journal of Electronics and Communications

IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE)

IOSR Journal of Electronics and Communication Engineering (IOSR-JECE)

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4

Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory)
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Seminars
Quiz
Open book tests
Group discussion
Assignments
Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

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SYLLABUS
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PHYSICS - I

CODE: 15PH/AC/PH13 **CREDITS: 3**
L T P: 3 0 0
TOTAL TEACHING HOURS: 39

OBJECTIVE OF THE COURSE

- To understand the fundamental concepts of Mechanics, Properties and Relativity

Unit 1 **(6 hrs.)**

Mechanics - I

1.1 Centre of Gravity of a Body- a System of Particles in a Straight Line- Compound Body - Centre of Gravity of a Solid Hemisphere and Solid Cone

Unit 2 **(7 hrs.)**

Mechanics - II

2.1 Simple Harmonic Motion – Periodic and Harmonic Motion- Energy of a Harmonic Oscillator- Compound Pendulum- Theory- Determination of 'G' with Bar Pendulum

2.2 Planetary Motion - Kepler's Law– Deduction of Newton's Law From Kepler's Law

Unit 3 **(6 hrs.)**

Elasticity

3.1 Elasticity: Moduli of Elasticity – Expression for Bending Moment – Depression at the Loaded End of the Cantilever – Depression and Elevation at the Mid Point of a Loaded Beam (Non- Uniform and Uniform Bending) – Torsion in a Wire – Torque Per Unit Twist – Torsional Oscillations – Expression for Period

Unit 4 **(7 hrs.)**

Surface Tension and Viscosity

4.1 Surface Tension: Definition – Angle of Contact – Variation of Surface Tension with Temperature – Determination of Surface Tension by Drop Weight Method- Interfacial Surface Tension

4.2 Stream Line Flow and Turbulent Flow – Critical Velocity – Euler's Equation of Continuity of Flow

Unit 5 **(13 hrs.)**

Relativity

5.1 Newton's Laws of Motion and its Limitations- Inertial Frames of Reference – Newtonian Relativity – Galilean Transformation Equations

5.2 Postulates of Special Theory of Relativity- Lorentz Transformation Equations- Length Contraction- Time Dilation- Twin Paradox and Meson Paradox

5.3 Relativistic Momentum (no derivation) – Mass Energy Relation- Physical Significance.

TEXT BOOKS

Murugeshan R. *Properties of Matter.* New Delhi: S Chand, 1994.

Narayanamurthi M. & N Nagarathnam. *Dynamics.* Chennai: The National, 1994.

Resnick, Robert. *Introduction to Special Relativity*. New Delhi: Wiley Eastern, 1989.

BOOKS FOR REFERENCE

Goldstein Herbert. Second Edition. *Classical Mechanics.* U.S.A: Addison & Wesely, 1980.

Halliday, David and Robert, Resnick. *Physics Vol.I.* Chennai: New Age, 1995.

Halliday, David Robert Resnick and Walker Jearl. *Fundamentals of Physics*. Kundhi: John Wiley, 2001.

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

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Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:

List of evaluation modes:

Seminar/Presentation

Quiz

Assignments

Problem solving

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes

Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5

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SYLLABUS
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PHYSICS PRACTICALS - I

CODE: 15PH /AC/P112 **CREDITS:2**
L T P: 0 0 3
TOTAL HOURS: 39

1. Compound Pendulum
2. Young's Modulus 'E' by Non-Uniform Bending- Pin And Microscope
3. Young's Modulus 'E' by Uniform Bending-Scale And Telescope
4. Rigidity Modulus 'G' by Torsional Oscillations (Moment Of Inertia to be assumed)
5. Surface Tension and Interfacial Surface Tension – Drop Weight Method.
6. Spectrometer – Determination of the Refractive Index of the Material of a Prism
7. Post Office Box – Verification of Laws and Determination of Specific Resistance
8. Characteristics of a Zener Diode
9. Newton's Law of Cooling – Verification of Law.

TEXT BOOK

Ouseph, C.C., Srinivasan, V., & Balakrishnan,R. *A Text Book of Practical Physics. Vol. I & II*., Chennai: S. Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks: 50 Duration: 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

STELLA MARIS COLLEGE (AUTONOMOUS), CHENAI-600 086
B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

THERMAL PHYSICS AND STATISTICAL MECHANICS

CODE: 15PH/MC/TS24 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To understand the concepts of heat and temperature
- To apply thermodynamic relations to problem solving

Unit 1 (10 hrs.)

Transport Phenomena and Radiation

1.1 Blackbody Radiation-Distribution of Energy in the Spectrum of a Black Body- Experimental Arrangement to Study Energy Distribution in Black Body Spectrum Experimental Results-Statements of Stefan-Boltzmann and Wiens' Displacement Law-Quantum Theory of Radiation

1.2 Average Energy of Planck's Oscillator-Planck's Hypothesis-Planck's Radiation Relation-Stefan-Boltzmann Law from Planck's Radiation Relation – Wien's and Rayleigh - Jeans Law From Planck's' Radiation Relation

Unit 2 (11hrs.)

Thermodynamics

2.1 Thermodynamic Systems-Thermal Equilibrium and Concept of Temperature-Zeroth Law of Thermodynamics –Thermodynamic Processes- Internal Energy- First Law of Thermodynamics (Statement)-Isothermal and Adiabatic Elasticity of a Gas

2.2 Second Law of Thermodynamics-Statements of Clausius and Kelvin-Principle of a Heat Engine-Thermodynamics of Refrigeration-Coefficient of Performance - Thermodynamic Potentials (Definition)

Unit 3 (10 hrs.)

Entropy

3.1 Entropy- Definition-Entropy Change in Reversible and Irreversible Processes-Entropy and Unavailable Energy-Entropy of a Perfect Gas-Temperature – Entropy Diagram - Technical Importance of T-S Diagram - Law of Increase of Entropy- Entropy and Disorder

3.2 Second Law of Thermodynamics in Terms of Entropy- Expression Connecting First and Second Laws of Thermodynamics - Statement of Third Law of Thermodynamics

Unit 4 **(10 hrs.)**

Maxwell's Thermodynamical Relations and Low Temperature Physics

4.1 Maxwell's Thermo Dynamical Relations

4.2 Deduction From Thermodynamical Relations 1) First and Second Tds Equations 2) Variation of Intrinsic Energy with Volume 3) $C_p - C_v = R$ 4) Clausius –Clapeyron Latent Heat Equation

Unit 5 **(11 hrs.)**

Low Temperature Physics and Maxwell-Boltzmann Statistics

5.1 Liquefaction of Gases-Liquefaction of Helium- Peculiar Properties of Liquid Helium II-Production of Very Low Temperature-Adiabatic Demagnetization of Paramagnetic Salt-Theory and Experiment

5.2 Definition of Phase Space-Micro and Macro States- Ensembles-Definition of Thermodynamic Probability-Relation between Entropy and Probability-Classical Statistics - Maxwell-Boltzmann Statistics

TEXT BOOKS

Ilangovan. K. *Thermal Physics*. Chennai: Popular, 2004.

Subrahmanyan. N and Lal Brij. *Heat Thermodynamics and Statistical Physics.* New Delhi: S. Chand, 2010.

Mathur.D.S. *Heat and Thermodynamics.* New Delhi: Sultan Chand, 2004.

Rajam,J.B. *Heat and Thermodynamics.* New Delhi: S Chand, 1981.

BOOKS FOR REFERENCE

Kakani,S.L. *Heat, Thermodynamics and Statistical Mechanics.* New Delhi: Sultan Chand, 1989.

Bhatia,V.S. *Thermodynamics and Kinetic Theory***,** New Delhi: Shobanlal Nagin Chand, 1993.

Das Gupta ,A.K. *Fundamentals of Statistical Mechanics.* Calcutta: New central 1994.

Gupta and Kumar. *Elementary Statistical Mechanics*. Meerut: Pragati Prakasham, 1993.

JOURNALS

Thermodynamics and Statistical Mechanics - Springer

Classical Continuum Physics – Springer

WEB RESOURCES

http://www.sites.fas.harvard.edu/6346 : Statistical Mechanics and Thermodynamics

PATTERN OF EVALUATION
Continuous Assessment:

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End Semester Examination

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B.Sc. PHYSICS : BRANCH III – PHYSICS

SYLLABUS
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EXPERIMENTAL PHYSICS – II

CODE:15PH/MC/P222 **CREDITS : 2**
L T P : 0 0 3
TOTAL HOURS : 39

1. Bifilar Pendulum
2. Rigidity Modulus 'G' by Static Torsion
3. Surface Tension of a Liquid by Capillary Rise Method
4. Absolute Determination and Comparison of Coefficient of Viscosities of Liquids
5. Sonometer – Verification of Laws and Determination of Frequency of Tuning Fork
6. Potentiometer – Ammeter Calibration (High Range and Low Range)
7. B. G – Determination of Absolute Capacity of a Condenser
8. Spectrometer – Grating – Normal Incidence (i) Standardization of the Grating (N) (ii) Determination of the Wavelength of the prominent lines of the Mercury Spectrum. (iii) Dispersive Power of the Grating
9. FET Characteristics.

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan. *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

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SYLLABUS
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PHYSICS - II

CODE:15PH/AC/PH23 **CREDITS: 3**
L T P: 3 0 0
TOTAL TEACHING HOURS: 39

OBJECTIVES OF THE COURSE

- To understand the principles of Electricity and Magnetism
- To introduce fundamental concepts of Optics and Electronics

Unit 1 **(6 hrs.)**

Electricity

1.1 Quantisation of Charge – Conservation of Electric Charge – Coulomb's Law of Force between Charges – Flux of Electric Field – Gauss's Law – Statement and Proof – Electric Field of a Point Charge Using Gauss Law – Electric Potential – Relation between Potential and Field Strength

1.2 Capacitance- Capacitance of Parallel Plate Capacitor with and without Dielectric

Unit 2 **(7 hrs.)**

Magnetism

2.1 Magnetic Field: Definition of B – Force on a Charge in a Magnetic Field, in an Electromagnetic Field (Lorentz Force) – Maxwell's Electromagnetic Equations (No Derivations) – Physical Significance of the Equations

2.2 Electromagnetism: Force on a Current Carrying Conductor in a Magnetic field – Moving Coil Ballistic Galvanometer – Theory, Current and Charge Sensitivity of B.G – Relation Between the Two

Unit 3

Geometrical Optics **(6 hrs.)**

3.1 Defects of Images- Monochromatic Aberrations – Spherical Aberrations in Lenses – Methods of Minimizing Spherical Aberration- Chromatic Aberration – Achromatic Combination of Lenses in Contact and Lenses Separated by a Distance

3.2 Optical Instruments: Telescopes – Angular Magnification of Telescopes – Refractive Astronomical Telescope – Terrestrial Telescope – Reflecting Telescopes – Radio Telescope – Hubble Telescope

Unit 4

Physical Optics (7 hrs.)

4.1 Interference: Newton's Rings – Measurement of Wavelength - Diffraction: Introduction – Fraunhofer Diffraction – Transmission Grating – Normal Incidence – Determination of Wavelength - Polarisation – Double Refraction – Nicol Prism – Optical Activity – Determination of Specific Rotatory Power Using Laurent's Half Shade Polarimeter – Uses of Polaroids

Unit 5

Electronics (13 hrs.)

5.1 Introduction to Amplifiers - Operational Amplifier – Ideal Op- Amp - CMRR – Inverting and Non- Inverting Op- Amp - Summing, Difference, Integral and Differential Op- Amp

5.2 Boolean Algebra- De Morgan's Theorem – Verification - Algebraic Simplification – Implementation of Boolean Algebra into Circuits

TEXT BOOKS

Subramaniam N. and Brijlal. *Optics.* New Delhi: S Chand, 2014.

Kakani, S L, and Bhandari K C. *A Text Book of Optics*. New Delhi: Sultan 2002.

Mahajan, A.S.,and Rangwala, A.A. *Electricity and Magnetism.* New Delhi: Tata McGraw Hill, 1993.

Mehta, V.K. *Principles of Electronics*. New Delhi: S Chand, 1991.

BOOKS FOR REFERENCE

Subrahmanyam, N. and Lal Brij. *A Text Book of Electricity and Magneti*sm. Agra: Ratan Prakash, 1994.

Haliday, David and Robert Resnick. *Physics Vol. II*. Chennai: New Age, 1995.

PATTERN OF EVALUATION

Continuous Assessment:

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Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))

Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component :

List of evaluation modes:

Seminar/Presentation

Quiz

Assignments

Problem solving

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
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Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

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SYLLABUS
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PHYSICS PRACTICALS - II

CODE: 15PH/AC/P222 **CREDITS:2**
L T P: 0 0 3
TOTAL HOURS: 39

1. Rigidity Modulus 'G' by Static Torsion
2. Newton's Rings – Determination of Radius of Curvature of a Lens
3. Spectrometer – Grating – Normal Incidence - Determination of Wavelengths (λ)
4. Joule's Calorimeter – Determination of Specific Heat of a Liquid – Half Time Correction
5. Potentiometer – Ammeter Calibration (Low Range)
6. OP AMP- Inverting and Non Inverting Amplifier
7. Specific Capacity of a Solid – Method of Mixtures
8. Carey Foster's bridge –Determination of Specific Resistance
9. Coefficient of Viscosity – Absolute Determination.

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan. *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

STELLA MARIS COLLEGE, (AUTONOMOUS), CHENNAI-600 086
B.Sc. DEGREE: BRANCH III –PHYSICS

SYLLABUS
(Effective from the academic year 2015-2016)

OPTICS AND SPECTROSCOPY

CODE: 15PH/MC/OS34 **CREDITS : 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To familiarise the students with fundamental principles of light
- To enable students to apply the principles of optics in relevant fields

Unit 1 (10 hrs.)

Geometrical Optics

1.1 Rectilinear Propagation of Light - Reversibility of the Path of the Rays of Light - Laws of Reflection and Refraction of Light

1.2 Thick Lenses - Focal Length - Critical Thickness - Power and Cardinal Points of a Thick Lens

1.3 Lens Aberrations: Monochromatic Aberrations - Spherical Aberration- Coma- Astigmatism - Curvature of the Field - Distortion - Chromatic Aberrations- Methods of Minimizing Aberrations - Eyepieces: Advantage of an Eyepiece over a Simple Lens - Huyghen's Eyepiece - Construction and Working

Unit 2 (11 hrs.)

Interference

2.1 Division of Wave Front : Fresnel's Biprism - Theory - Fringes with White Light

2.2 Division of Amplitude: Interference in Thin Films due to Reflected Light - Colours of Thin Films - Newton's Rings - Theory

2.3 Interferometers: Michelson's Interferometer - Determination of the Wavelength of a Monochromatic Source of Light

Unit 3 (10 hrs.)

Diffraction

3.1 Introduction - Fresnel's Assumptions - Zone Plate- Action of Zone Plate for an Incident Spherical Wave Front - Differences between a Zone Plate and a Convex Lens

3.2 Fresnel Type of Diffraction: - Diffraction Pattern Due to a Straight Edge - Positions of Maximum and Minimum Intensities - Diffraction Due to a Narrow Slit
Fraunhofer Type of Diffraction: Fraunhofer Diffraction at a Single Slit- Plane Diffraction Grating – Theory- Experiment to Determine Wavelengths

3.3 Resolving Power of Optical Instruments: Rayleigh's Criterion for Resolution – Resolving Power of (i) Telescope and (ii) Microscope

Unit 4 **(11 hrs.)**

Polarisation

4.1 Double Refraction- Optic Axis Principal Plane - Nicol Prism- Construction and Action

4.2 Elliptically and Circularly Polarized Light - Quarter Wave Plate - Half Wave Plate. Production and Detection of Circularly Polarized Light and Elliptically Polarized Light

4.3 Optical Activity - Fresnel's Explanation - Specific Rotation – Laurent's Half Shade Polarimeter - Experiment to Determine Specific Rotatory Power

Unit 5 **(10 hrs.)**

Spectroscopy

5. 1 Infra-Red Spectroscopy - Properties - Origin of Infra-Red Spectra - IR Spectrophotometer – Applications

5.2 Scattering of Light - Raman Effect - Classical Theory - Quantum Theory - Mutual Exclusion Principle - Raman Spectrometer-Characteristics of Raman Lines - Applications

5.3 Ultraviolet and Visible Spectroscopy - Properties - Spectrophotometer

TEXT BOOKS

Agarwal B. S. *Optics*. Meerut: Kedernath Ramnath**,** 1979.

Banwell N. Colin., Elaine M. McCash. *Fundamentals of Molecular Spectroscopy*. New Delhi: Tata McGraw Hill, 2006.

Subramaniam N. and Brijlal. *Optics*. New Delhi: S Chand, 2014.

BOOKS FOR REFERENCE

Chang Raymond. *Basic Principles of Spectroscopy.* New Delhi: Tata McGraw Hill, 1971.

Jenkins A.Francis and White. *Fundamentals of Optics.* New Delhi: Tata McGraw Hill, 2001.

JOURNALS

The Journal of the Optical Society of America
Elsevier Journal of Optics & Laser Technology

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.
Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:

List of evaluation modes:
Seminar

Quiz
Open book tests
Assignment
Problem solving

End Semester Examination:

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes

Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5

Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))

Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

MECHANICS

CODE: 15PH/MC/ME34 **CREDITS:4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To understand physical laws and concepts of static and dynamic bodies
- To introduce the idea of Lagrangian Mechanics

Unit 1

Impact (10 hrs.)

1.1 Impulse –Impact -Laws of Impact-Conservation of Linear Momentum
1.2 Impact between two Smooth Bodies- Direct Impact between two Smooth Spheres
1.3 Oblique Impact between two Smooth Spheres-Impact of a Smooth Sphere on a Smooth Fixed Horizontal Plane

Unit 2

Simple Harmonic Motion (10 hrs.)

2.1 Periodic and Harmonic Motion- Simple Harmonic Motion-Energy of a Harmonic Oscillator- Examples
2.2 Free, Damped Vibrations
2.3 Forced Vibrations and Resonance

Unit 3

Rigid Body Dynamics (12 hrs.)

3.1 Moment of Inertia of a Uniform Rod- Rectangular Lamina – Uniform Circular Disc – Solid Sphere - Solid Cylinder
3.2 The Compound Pendulum- Determination of 'G'- Centre of Suspension and Centre of Oscillation- Minimum Periods of a Compound Pendulum-Bifilar Pendulum- Parallel and Non-Parallel Threads
3.3 Gyroscopic Precision- Gyroscopic Top

Unit 4

Centre of Gravity (10 hrs.)

4.1 Centre of Gravity of a Body- a System of Particles in a Straight Line-Compound Body- Remainder
4.2 Centre of Gravity of a Solid and Hollow Hemisphere
4.3 Centre of Gravity of a Solid Tetrahedron -Solid Cone

Unit 5

Lagrangian Mechanics (10 hrs.)

5.1 Degrees of Freedom – Constraints

5.2 Principle of Virtual Work and D' Alembert's Principle

5.3 Lagrange's Equation From D' Alembert's Principle – Application- Simple Pendulum – Atwood's Machine

TEXT BOOKS

Mathur,D.S. *Mechanic.* New Delhi: S. Chand, 1994.

Narayanamurthi, M. and Nagarathnam, N. *Dynamics*. Chennai: The National Publishing, 1994.

Narayanamurthi, M. and Nagarathnam. N. *Statics, Hydrostatics and Hydrodynamics.* Chennai: National, 1982.

BOOKS FOR REFERENCE

Goldstein Herbert. *Classical Mechanics.* U.S.A: Addison and Wesely, 1980.

Halliday, David and Robert, Resnick. *Physics Vol.I.* Chennai: New Age, 1995.

Halliday, David Robert Resnick and Walker Jearl. *Fundamentals of Physics*. New Delhi: John Wiley, 2001.

JOURNALS

Science Direct – Publishers
European Journal of Mechanics

WEB RESOURCES

https://www.coursera.org/course/particles2planets

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.
Section A – 20x1=20
Multiple choice – 10, Fill in the blanks – 5, True or False – 2, Answer briefly – 3
Section B – 3x5=15 (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1x15=15 (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Presentation of working models
Assignments
Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.Sc. PHYSICS : BRANCH III – PHYSICS

SYLLABUS
(Effective from the Academic year 2015-2016)

EXPERIMENTAL PHYSICS – III

CODE: 15PH/MC/P332 **CREDITS : 2**
L T P : 0 0 3
TOTAL HOURS : 39

1. Melde's Apparatus – Determination of the Frequency of the Tuning Fork Using – Transverse and Longitudinal Mode of Vibrations of the String.
2. Newton's Rings – Determination of M.
3. Potentiometer – Determination of Resistance and Specific Resistance
4. Ballistic Galvanometer – Comparison of EMF and Internal Resistance
5. Latent Heat of Fusion of Ice - Barton's Correction.
6. Multimeter- Conversion of Low Range Ammeter to Of High Range Ammeter.
7. Spectrometer - Dispersive Power of The Prism and Cauchy's Constants
8. OP AMP –Adder, Subtractor, Inverting and Non- Inverting Amplifiers
9. RC Amplifier

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan, *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
Allied Core Offered by the Department of Physics to Students of Chemistry

SYLLABUS
(Effective from academic year 2015-2016)

PHYSICS-I

CODE:15PH/AC/PH33 **CREDITS : 3**
LTP : 3 0 0
TOTAL TEACHING HOURS : 39

OBJECTIVES OF THE COURSE

- To acquaint students with the fundamental laws and principles of physics
- To familiarise students with developments in modern optics

Unit 1 **(6 hrs.)**

Properties of Matter

1.1 Elasticity: Moduli of Elasticity – Poisson's Ratio- Young's Modulus – Bending of Beams - Expression for Bending Moment-Depression at the Loaded End of the Cantilever-Depression and Elevation at the Mid Point of a Loaded Beam- Torsion in a Wire–Torsional Oscillations–Torque Per Unit Twist- Expression for Period

Unit 2 **(7 hrs.)**

Surface Tension and Viscosity

2.1 Introduction-Experimental Determination of Surface Tension and Interfacial Surface Tension by Drop Weight Method –Variation of Surface Tension with Temperature-Streamline and Turbulent Flow –Critical Velocity- Expression for Critical Velocity- Variation of Viscosity with Temperature

Unit 3 **(6 hrs.)**

Mechanics

3.1 Dynamics: Moment of Inertia – Definition - Compound Pendulum - Expression for the Period of Oscillation-Centre of Suspension and Centre of Oscillation–Minimum Period of Oscillation of a Compound Pendulum-Determination of 'G'

Unit 4 **(13 hrs.)**

Relativity

4.1 Inertial Frames of Reference-Special Theory of Relativity—Postulates of Special Theory of Relativity-Lorentz Transformation Equations-Length Contraction-Time Dilation – Experimental Evidence – Twin Paradox – Relativistic Momentum (no derivation) – Mass Energy Relation – Physical Significance

Unit 5 **(7 hrs.)**

Optics

5.1 Interference: Introduction - Interference Due to Reflected Light – Newton's Rings – Measurements of Wavelength
Diffraction: Introduction-Fraunhoffer Diffraction- Transmission Grating-Normal Incidence – Determination of Wavelength

5.2 Polarisation: Introduction-Plane of Polarization-Polarisation by Refraction-Brewster's Law-Polarisation by Reflection-Double Refraction – Nicol Prism – Nicol Prism as a Polarizer and Analyser – Polaroids-uses of Polaroids

TEXT BOOKS

Murugeshan.R, *Properties of Matter*. New Delhi: S. Chand, 2012.

Naranyanamurthi.M and Nagaratham.N. *Dynamics.* Chennai: The National, 1994.

Naranyanamurthi.M and Nagaratham.N. *Statics*. Chennai: The National, 1994.

Murugeshan.R, *Modern Physics*. New Delhi: S Chand, 2013.

Subrahmanyan. Nand Lal Brij. *Textbook of Optics.* New Delhi: Vikas, 2013.

BOOK FOR REFERENCE

Halliday,David and Robert Resnick. *Physics Vol I and II*. Chennai: New Age, 1995.

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Seminars
Quiz
Open book tests
Group discussion
Assignments
Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours.

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
Allied Core Offered by the Department of Physics to the Students of Chemistry

SYLLABUS
(Effective from the academic year 2015 – 2016)

PHYSICS PRACTICALS - I

CODE:15PH/AC/P132 **CREDITS:2**
L T P: 0 0 3
TOTAL HOURS: 39

1. Compound Pendulum
2. Young's Modulus 'E' by Non-Uniform Bending- Pin and Microscope
3. Young's Modulus 'E' by Uniform Bending-Scale and Telescope
4. Rigidity Modulus 'G' by Torsional Oscillations (Moment of Inertia to be assumed)
5. Surface Tension and Interfacial Surface Tension – Drop Weight Method
6. Spectrometer – Determination of the Refractive Index of the Material of a Prism
7. Post Office Box – Verification of Laws and Determination of Specific Resistance
8. Characteristics of a Zener Diode
9. Newton's Law of Cooling – Verification of Law

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan, *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-600 086

B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the year 2015-2016)

MATHEMATICAL PHYSICS

CODE: 15PH/MC/MP44 **CREDITS: 4**

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To enable students to learn various mathematical techniques
- To facilitate the applications of these techniques to physical problems

Unit 1 **(8 hrs.)**

Vector Calculus

1.1 Scalar Point Function - Gravitational Potential and Electrostatic Potential - Vector Point Function – Electric Intensity and Magnetic Field - Directional Derivatives - Gradient of a Scalar Field.

1.2 Vector Differentiation – Determination of Velocity and Acceleration From Position Vector - Partial Differentiation of Vectors

Unit 2 **(10 hrs.)**

Vector Analysis

2.1 The Divergence of a Vector Function - the Curl or Rotation of a Vector Function - Geometrical Interpretation - Physical Significance.

2.2 Relations between Gradient, Divergence and Curl – Electrostatic Potential and Field – Maxwell's Equations.

Unit 3 **(12 hrs.)**

Vector Integration

3.1 Vector Integration: Ordinary Integrals of Vectors - Line Integrals - Surface Integrals - Volume Integrals.

3.2 Gauss's Theorem - Statement and Physical Interpretation - Stoke's Theorem and Green's Theorem (Statement Only) - Poisson's Equation and Laplace's Equations - Their Applications in Gravitation, Hydrodynamics and Electromagnetism.

Unit 4 **(12 hrs.)**

Differential Equations

4.1 Initial and Boundary Value Problems - Applications of First Order Differential Equations - Falling Body Problems - Electrical Circuits (RL and RC).

4.2 Second Order Differential Equations with Constant Coefficients: The Characteristic Equation – General Solutions - Applications of Second Order Differential Equations - (i) System of Springs (ii) Electrical Circuits (LCR).

Unit 5 **(10 hrs.)**

Group Theory

5.1 Group Theory - Definition of Groups - Subgroups - Symmetry Elements Transformation - Point Groups - Representation of a Group.

5.2 Applications of Group Theory – Elementary Particles - Application to IR and Raman Active Vibrations.

TEXT BOOKS

Bronson Richard. *Schaum's Outline of Theory and Problems of Differential Equations.* New Delhi: Tata McGraw Hill, 2014.

Gupta B.D. *Mathematical Physics.* New Delhi: Vikas, 2006.

Murray R.Spiegel. *Schaum's Outline of Theory and Problems of Vector Analysis.* New Delhi: Tata McGraw Hill, 1974.

Satyaprakash. *Mathematical Physics.* New Delhi: Sultan Chand, 2004.

BOOKS FOR REFERENCE

Dass M.K. *Mathematical Physics.* New Delhi: S.Chand, 2001.

Prakash Satya. *Mathematical Physics with Classical Mechanics.* New Delhi: Sultan Chand, 2004.

JOURNALS

Journal of Mathematical Physics
Communications in Mathematical Physics

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.
Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component :

List of evaluation modes:
Seminar/Presentation
Quiz
Open book tests
Assignments
Problem solving

END SEMESTER EXAMINATION:
Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN
Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.Sc. PHYSICS : BRANCH III – PHYSICS

SYLLABUS
(Effective from the Academic year 2015-2016)

EXPERIMENTAL PHYSICS – IV

CODE: 15PH/MC/P442 **CREDITS : 2**
L T P : 0 0 3
TOTAL HOURS : 39

1. Newton's Law of Cooling – (i) Verification (ii) Determination of Specific Heat Capacity of a Liquid (iii) Determination of Emissivity of the Surface
2. Joule's Calorimeter – Determination of Specific Heat Capacity of a Liquid – Barton's Correction.- use P.O Box to find Resistance of the Coil
3. Polarimeter – Determination of Specific Rotatory Power
4. Determination Of Self Inductance Using LCR Resonance Circuit
5. Potentiometer – Determination of EMF of a Thermocouple
6. B.G. – High Resistance by Leakage
7. Field along the axis of the Coil – Determination of M and M
8. Study of Universal Gates
9. K- Map - Simplification

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan, *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086
B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 -2016)

PHYSICS –II

CODE: 15PH/AC/PH43 **CREDITS : 3**
L T P : 3 0 0
TOTAL TEACHING HOURS : 39

OBJECTIVES OF THE COURSE

- To understand the basic concepts of electricity and magnetism
- To familiarise students with developments in modern physics and electronics

Unit 1 **(6 hrs.)**

Electricity

1.1 Coulomb's Law of Inverse Squares - Flux of Electric Field - Gauss's Law – Application of Gauss's Law to Determine Field a Point Charge, Spherical Charge Distribution, Infinite Line Charge Distribution and Cylindrical Charge Distribution

1.2 Conservative Nature of Electrostatic Field – Electric Field – Electric Potential – Potential at a Point Due to Point Charge- Relation between Potential and Field Strength, Capacitance : Principle- Capacitance of a Parallel Plate Capacitor with and Without Dielectric

Unit 2 **(5 hrs.)**

Magnetism

2.1 Magnetic Field - Force on a Charge in a Magnetic Field - Force on a Charge in an Electro Magnetic Field (Lorentz Force) - Maxwell's Electromagnetic Equations (no derivations) - Physical Significance of the Equations.- Magnetic Properties of Materials - Relation Between Relative Permeability and Susceptibility

2.2 Hysteresis- Magnetometer Method of Drawing Hysteresis Curve - Energy Laws – Retentivity - Coercivity - uses of Hysteresis Curves

Unit 3 **(5 hrs.)**

Electromagnetism

3.1 Force on a Current Carrying Conductor in a Magnetic Field – Moving Coil Ballistic Galvanometer - Figure of Merit of Ballistic Galvanometer for Charge and Current Sensitivity

Unit 4 **(10 hrs.)**

Modern Physics

4.1 MASER : Description and working of Ammonia MASER
LASER : LASER Action – Population Inversion – Carbon Dioxide LASER Applications

4.2 Holography : Principles – Preparation of Holograms Applications- Fibre Optics : Principles – Characteristics – Classification – Applications

Unit 5 **(13 hrs.)**

Electronics

5.1 Introduction to Amplifiers - Operational Amplifier - Ideal Op - Amp - CMRR - Inverting and Non- Inverting Op-Amp – Summing - Difference - Integral and Differential Op - Amp.

5.2 Boolean Algebra- De Morgan's Theorem – Verification. Algebraic Simplification – Implementation of Boolean Algebra into Circuits

TEXT BOOKS

Mehta, V.K. *Principles of Electronics.* New Delhi: S Chand , 2014.

Murugeshan.R. *Modern Physics*, New Delhi: S Chand, 2013.

Subrahmanyam, N. and Lal Brij. *A Text Book of Electricity and Magnetism*. Agra: Ratan Prakash, 1994.

BOOKS FOR REFERENCE

Haliday, David and Robert Resnick. *Physics Vol.* II. Chennai: New Age, 1995.

Kakani, S L, and Bhandari K C. *A Text Book of Optics.* New Delhi: Sultan Chand, 2002.

Laud .B.B. *Lasers and Non – Linear Optic.* New Delhi: Wiley Eastern, 1991.

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory)
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:

List of evaluation modes:
Seminar
Quiz
Open book tests
Assignment

Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes

Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5

Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))

Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
Allied Core Offered by the Department of Physics to the Students of Chemistry

SYLLABUS
(Effective from the academic year 2015 – 2016)

PHYSICS PRACTICALS - II

CODE: 15PH/AC/P242 **CREDITS:2**
L T P: 0 0 3
TOTAL HOURS: 39

1. Rigidity Modulus 'G' By Static Torsion
2. Newton's Rings – Determination of Radius of Curvature of a Lens
3. Spectrometer – Grating – Normal Incidence - Determination of Wavelengths (Λ)
4. Joule's Calorimeter – Determination of Specific Heat of a Liquid – Half Time Correction
5. Potentiometer – Ammeter Calibration (Low Range)
6. OP AMP- Inverting And Non Inverting Amplifier
7. Specific Capacity of A Solid – Method of Mixtures
8. Carey Foster's Bridge –Determination of Specific Resistance
9. Coefficient of Viscosity – Absolute Determination

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan, *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086
Allied Elective Course Offered by Department of Physics to Chemistry, Plant Biology and Plant Biotechnology and Advanced Zoology and Biotechnology

SYLLABUS
(Effective from the academic year 2015-2016)

FUNDAMENTALS OF NANOSCIENCE

CODE: 15PH/AE/FN45 **CREDITS: 5**
L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To introduce students to the developing field of nanoscience and technology
- To provide an understanding of the methods of synthesis, characterisation techniques and applications of nanomaterials

Unit 1 **(13 hrs.)**

Introduction to Nanoscience

1.1 Introduction- Nano and Nature-Background to Nanotechnology- Nanoscale
1.2 Bulk to Nano Transition- Nanosize Effects - Size Dependent Phenomena - Quantum Confinement

Unit 2 **(13 hrs.)**

Nano Particles and its Properties

2.1 Metal Nanoparticles: Structural and Optical Properties
2.2 Semiconductor Nanoparticles: Semiconductor Quantum Dots, Correlation of Properties with Size
2.3 Carbon Nanostructures: Introduction- Fullerenes- -CNT- Graphene- Properties

Unit 3 **(13 hrs.)**

Synthesis of Nanomaterials

3.1 Physical Method: Ball Milling, Sputter Deposition.
3.2 Chemical Methods: Co-Precipitation- Sol-Gel Synthesis- Solvothermal - Bio Synthesis of Nanoparticles (Metal Nano Particles Au, Ag)
3.3 Vapour Method-Thermal Evaporation-Chemical Vapour Deposition (CVD).

Unit 4 **(13 hrs.)**

Characterisation Techniques

4.1 Powder X-Ray Diffraction
4.2 Scanning Electron Microscope(SEM)- Transmission Electron Microscope(TEM).
4.3 UV-Vis Absorption Spectroscopy-Photo Luminescence.

Unit 5 **(13 hrs.)**

Applications of Nanomaterials

5.1 Applications in Chemical Sciences: Solar Cells, Catalysis Photo-catalytic Applications,

5.2 Applications in Life Sciences: Biosensors, Nanomedicine, Drug Delivery.

TEXT BOOKS

GuoZhong Cao. *Nanostructures and Nanomaterials*. U.K: Imperial College, 2004.

Viswanathan B. *Nano Materials*. India : Narosa, 2010.

Pradeep T. *Nano: The Essentials.* New Delhi: Tata Mcgraw Hill, 2007.

BOOKS FOR REFERENCE

P. Poole Charles, Jr. Frank J. Owens. *Introduction to Nanotechnology.* New Delhi: Wiley, 2009.

D. Miller John, *A Hand Book on Nanophysics.* India: Dominant, 2008.

Mick Wilson, Kamalikannangora Geoff Smith, Michelle Simmons, Burkhard Raguse. *Nanotechnology- Basic Science and Emerging Technologies.* New Delhi: Overseas, 2005.

JOURNALS

American Chemical Society publishers
Journal of Physical Chemistry (Review articles)
Chemical Reviews
Springerlink Publishers
Journal of Nanoparticle Research
Elsevier Publishers
Nano Today

WEB RESOURCES

http://www.slideshare.net/MazharLaliwala/introduction-to-nanoscience-and-nanotechnology

PATTERN OF EVALUATION

Continuous Assessment

Total Marks: 50 Duration: 90 mins.

Section A – 5x3= 15 (All questions to be answered)
Section B – 4x5= 20 (4 out of 5 to be answered)
Section C – 1x15=15 (1 out of 2 to be answered)

Third Component:
Project
Assignments
Seminar

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered
Section C – 3 x 15 = 45 Marks (3 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086

B.Sc. BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015-2016)

ELECTROMAGNETISM

CODE: 15 PH/MC/EM54 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To enable students to understand the fundamental concepts of classical electromagnetic theory
- To understand the complementary nature of electric and magnetic phenomena

Unit 1 **(10 hrs.)**

Electrostatics

1.1 Electrostatic Field - Coulomb's Law – Divergence and Curl of Electrostatic Field – Gauss's Law – Application – Cylindrical Charge Distribution

1.2 Electric Potential - Poisson's Equation – Laplace's Equation – Work Done in Moving a Charge – Energy of a Point Charge Distribution - Energy of a Continuous Charge Distribution – Electrostatic Boundary Conditions

Unit 2 **(10 hrs.)**

Electrostatic Fields In Matter

2.1 Polarisation - Induced Dipoles – Alignment of Polar Molecules

2.2 Capacitors - Parallel Plate Capacitors-Field Inside a Dielectric – Gauss's Law in the Presence of Dielectrics

Unit 3 **(15 hrs.)**

Magnetostatics

3.1 Biot – Savart Law – Steady Currents – Magnetic Fields Due to Steady Currents Flowing (I) in a Long Straight Wire at a Point Near It (Ii) Along a Circular Coil at a Point on Its Axis (Iii) Along a Solenoid at a Point on its Axis- Divergence and Curl of **B** - Straight Line Currents

3.2 Ampere's Law – (I) Magnetic Field at a Point Near a Long Straight Wire Carrying Steady Current. – (Ii) Magnetic Field of a Long Solenoid (Iii) Magnetic Field of a Toroidal Coil – Comparison of Magnetostatics and Elelctrostatics- Lorentz Force Law - Currents – Current Density Magnetic Vector Potential - Ampere's Law in Terms of Vector Potential – Magnetostatic Boundary Conditions

Unit 4 **(8 hrs.)**

Magnetostatic Fields in Matter

4.1 Magnetic Properties of Materials – Torque and Forces on Magnetic Dipoles– Magnetization

4.2 Linear and Non-Linear Media – Magnetic Susceptibility – Magnetic Field and its Equations (I) $B = \mu_o (H+M)$ (Ii) $\mu = \mu_o (1+\chi_M)$ (Iii) $\mu_x = 1+\chi_M$

Unit 5 **(9 hrs.)**

Electrodynamics

5.1 Faraday's Laws - Electromagnetic Induction - Inductance - Self Inductance - Mutual Inductance - Energy in Magnetic Fields

5.2 Maxwell's Equations - Maxwell's Equations and Magnetic Charge - Maxwell's Equations inside Matter - Boundary Conditions

TEXT BOOKS

Halliday David, Resnik Robert and Walker Jearl. *Fundamentals of Physics.* New Delhi: John Wiley, 2005.

Sehgal, D.L., K.L. Chopra, N.K. Sehgal. *Electricity and Magnetism.* New Delhi: Sultan Chand, 1992.

Tewari K.K. *Electricity and Magnetism.* New Delhi: S Chand, 1987.

BOOKS FOR REFERENCE

Chattopadhyay D., and Rakshit P.C. *Electricity and Magnetism.* Kolkata: New Central Book Agency, 2005.

Griffiths David J. *Introduction to Electrodynamics.* New Delhi: Prentice, 1997.

Mahajan A.S and A. A Rangwala. *Electricity and Magnetism.* New Delhi: Tata McGraw Hill,1988.

JOURNALS

Journal of Magnetism and Magnetic Materials - Elsevier
www.journals.elsevier.com/journal-of-magnetism-and-magnetic-materials
Student Science Journal: Electricity and Magnetism
www.planetseed.com › Science › Student Science Journal

WEB RESOURCES

Electricity and Magnetism | Physics | MIT OpenCourseWare
ocw.mit.edu › Courses › Physics
Science Center Spectrum - Electricity and magnetism
www.sdtb.de/Electricity-and-magnetism.1107.0.html

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 mins.
Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Seminars
Quiz
Open book tests
Group discussion
Assignments
Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

B.Sc. DEGREE: BRANCH – III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

MICROPROCESSORS AND MICROCONTROLLERS

CODE: 15PH/MC/MM54 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To understand the architecture of microprocessor 8085
- To develop programming skills for writing assembly languages for microprocessor 8085
- To learn the basic concepts of microcontroller 8051

Unit 1

Central Processing Unit (CPU) (10 hrs.)

1.1 Bus Structure - Address, Data and Control System Bus - Memory and I/O Interface Block Diagram - CPU 8085

1.2 Architecture: General Purpose Registers, ALU, Accumulator, Program Counter, Instruction Register, Stack, Push/Pop Operations, Flag Register

Unit 2

Addressing Modes and Instruction Set (10 hrs.)

2.1Addressing Modes: Direct, Register, Immediate, Register in-Direct Addressing Modes

2.2 Instruction Set: Data Transfer Group, Arithmetic Group, and Logic Group Instruction

Unit 3

Software Program (10 hrs.)

3.1 Arithmetic Operations: Addition, Subtraction, Multiplication and Division of Single Byte Numbers - Multi-Byte Addition

3.2 Search an Array for a given Byte-Sorting an Array in Ascending / Descending Order

3.3 Conversion of BCD to Hexadecimal and Vice Versa-Square Root of a Positive Single Byte Number

Unit 4

Interfacing I/O devices and Interrupt Circuit (10 hrs.)

4.1 Type of Interfacing Devices: Address Decoding for I/O - Input and Output Ports - Programmable I/O Ports - Programmable Interface - Programming the 8255A

4.2 8085 Interrupt Circuit-Restart Instructions - Hardware Interrupts - Interrupt Priorities

Unit 5

Microcontrollers and Embedded systems (12hrs.)

5.1 Micro-Controller - 8051 - Architecture-Applications

5.2 Embedded System Concept - Embedded Microcontroller Pic Series - Applications

TEXT BOOKS

Ramesh Gaonkar. *Microprocessor Architecture, Programming and Applications with the 8085.* New Delhi: Penram, 1997.

Vijayendran, V. *Fundamentals of Microprocessor- 8085 Architecture Programming and Interfacing.* Chennai: S. Viswanathan, 2006.

Vahid Frank and Givargis Tony. *Embedded System Design-Unified Hardware Software Introduction.* New Delhi, John Wiley, 2002.

BOOKS FOR REFERENCE

Adithya .P. Mathur. *Introduction to Microprocessors*. New Delhi: Tata McGraw Hill, 1995.

Er.R Gopalsamy. *Microcontroller.* Madurai: Veni, 2004.

Ghosh,A.K., and P.K. Sridhar. *0000 to 8085 Introduction to Microprocessor for Engineers and Scientists.* New Delhi: PHI, 1995.

Kenneth J. Ayala. *8051 Microcontroller – Architecture, Programming and applications.* New Delhi: Penram, 1996.

Mohammed Rafi Qubbaman. *Microprocessors and Microcomputer – Based System Design.* New Delhi: UBS, 1986.

Rajkamal. *Microcontroller, Architecture, Programming, Interfacing and System Design.* U. K: Pearson, 2005.

JOURNALS

Elsevier - Journal of Microprocessors and Microsystems: Embedded Hardware Design

WEBRESOURCES

http://www.phy.davidson.edu/FacHome/dmb/py310/8085.pdf

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

Section A – 20x1=20
Multiple choice – 10, Fill in the blanks – 5, True or False – 2, Answer briefly – 3
Section B – 3x5=15 (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1x15=15 (1 out of 2 to be answered)

Third Component :

List of evaluation modes:
Quiz
Open book tests
Assignments
Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.Sc. PHYSICS : BRANCH III – PHYSICS

SYLLABUS
(Effective from the Academic year 2015-2016)

EXPERIMENTAL PHYSICS – V

CODE: 15PH/MC/P552 **CREDITS : 2**
L T P : 0 0 3
TOTAL HOURS :39

1. Spectrometer – i– d Curve.
2. Spectrometer - Solar Spectrum
3. Ballistic Galvanometer –Coefficient of Mutual Inductance
4. Potentiometer – Calibration of High Range Voltmeter
5. Copper Voltameter – Determination of E.C.E of Copper – T. G
6. Field along the Axis– Vibration Magnetometer
7. Carey Foster's Bridge- Verification of Laws and Specific Resistance.
8. Microprocessor- Basic Arithmetic Operations.
9. Sine Wave Generator - 741

   Square Wave Generator – 555

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan, *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION

CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086

B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the year 2015 – 2016)

SOLID STATE PHYSICS

CODE : 15PH/MC/SS54 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To study crystal bonding and imperfections in crystals
- To learn the properties of solids

Unit 1 **(6 hrs.)**

Crystal Bonding

1.1 Bonding in Solids – Bond Energy- Bond Length-Types of Bonding –Primary Bonds- Ionic Bonding – Potential Energy Diagram of Ionic Molecule

1.2 Covalent Bond (Qualitative Treatment Only) – Properties of Covalent Solids Metallic Bond – Properties of Metallic Solids

Unit 2 **(14 hrs.)**

Crystal Imperfections

2.1 Classification of Imperfections- Point Defects - Schottky and Frenkel Defects – Electronic Defects- Energy of Formation of a Vacancy-Equilibrium Concentration of Schottky and Frenkel Defects in Ionic Crystals

2.2 Line Defects- Edge Dislocation- Burgers Vector- Screw Dislocation

Unit 3 **(10 hrs.)**

Electrical Properties of Solid

3.1 Classical Free Electron Theory of Metals – the Free Electron Gas – Drude Lorentz Free Electron Theory – Ohm's Law – Expressions for Electrical Conductivity – Thermal Conductivity-Wiedemann and Franz Ratio

3.2 Hall Effect– Hall Voltage – Hall Coefficient – Mobility and Hall Angle – Experimental Determination of Hall Coefficient

Unit 4 **(11 hrs.)**

Magnetic Properties of Solids

4.1 Different Types of Magnetic Materials– Langevin's Theory of Diamagnetism (Qualitative Treatment Only)–Langevin's Theory of Paramagnetism-Curie's Law-Failure of Langevin's Theory-Weiss Theory of Paramagnetism-Curie-Weiss Law

4.2 Ferromagnetism-Domain Theory of Ferromagnetism- Exchange Energy-Magnetic Energy-Anisotropic Energy-Domain Wall-Hysteresis Loop of a Ferro Magnetic Material-Explanation of Hysteresis with Domain Theory-Antiferro and Ferrimagnetic Materials- Application of Ferromagnets and Ferrites

Unit 5 **(11 hrs.)**

Superconductivity

5.1 Introduction–Effect of Magnetic Field – Magnetic Properties of Superconductors – Perfect Diamagnetism or the Meissner Effect – Type I and Type II Superconductors – Isotope Effect

5.2 Thermodynamic Effects – Entropy, Specific Heat, Thermal Conductivity – Energy Gap- BCS Theory of Superconductivity – Application of Superconductors

TEXT BOOKS

Ilangovan. K. *Solid State Physics.* Chennai: S.Viswanathan 2013.

Planisamy P K. *Solid state Physics*. Chennai: SCITECH, 2006.

Saxena, B.S., R.C. Gupta and P.C. Saxena. *Fundamentals of Solid State Physics*, Meerut: Pragati, 2001.

Singhal, R.L. *Solid State Physics.* Meerut: K. Nath, 2015.

BOOKS FOR REFERENCE

Azarof Leonid. V. *Introduction to Solids.* New Delhi: Tata McGraw Hill, 2002.

Charles Kittel. *Introduction to Solid State Physics.* Singapore: Kin Keong, 2005.

Ali Omar M.. *Elementary Solid State Physics*. New Delhi: Replik, 2006.

Saxena. H.C. and Agarwal. K.*L. Principles of Electronics and Solid State Physics.* Agra: Ravi, 2005.

JOURNALS

Journal of Solid State Physics — An Open Access Journal
Solid State Sciences - Journal - Elsevier

WEBRESOURCES

www.solid.phys.ethz.ch/
www.springer.com › Home › Materials

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component s:
List of evaluation modes:
Seminars
Quiz
Open book tests
Group discussion
Assignments
Problem solving
.

End Semester Examination

Total Marks: 100 Duration: 3 Hours
Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENAI-600 086

B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

COMMUNICATION SYSTEMS

CODE:15PH/ME/CS55 **CREDITS: 5**
L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To acquaint students with concepts of communication systems
- To understand the principles of optical and mobile communication systems

Unit 1 **(13 hrs.)**

Communication Principles

1.1 Types of Modulation – Amplitude Modulation – Modulation Factor – Analysis of Amplitude Modulated Wave – Energy Distribution in AM Wave

1.2 Frequency Modulation - Analysis of Frequency Modulated Wave – Phase Modulation – Comparison of Frequency and Amplitude Modulation

1.3 Pulse Amplitude Modulation – Pulse Width – Pulse Coded Modulation (Principles Only)

Unit 2 **(13 hrs.)**

Radiation Propagation

2.1 Fundamentals of Electromagnetic Waves – Propagation of Waves – Ground Waves – Sky Waves

2.2 Space Wave Propagation – Effect of Earth's Curvature – Atmospheric Effects- Ionosphere and Its Stratification

Unit 3 **(13 hrs.)**

RADAR Systems and Microwave Generations

3.1 Radar Systems – Basic Principles – Basic Pulsed Radar System – Block Diagram and Description – Radar Range Equation – Uses of Radar – Doppler Radar Systems

3.2 Microwave Communication – Introduction – Generation of Microwaves – Magnetron Oscillator – Working – Klystron Oscillator – Velocity Modulation– Multicavity Klystron – Reflex Klystron

Unit 4 **(13hrs.)**

Fibre Optic Communication

4.1 Introduction – Importance of Optical Fibres – Propagation of Light Waves in an Optical Fibre – Basic Structure of an Optical Fibre – Propagation of Light Wave Through an Optic Fibre – Acceptance Angle and Acceptance Cone of a Fibre – Modes of Propagation – Meridinial and Skew Rays

4.2 Classification of Optical Fibres – Stepped Index Fibre – Disadvantages of Monomode Fibre – Graded Index Multimode Fibre – Fibre Losses – Attenuation in Optic Fibres- Material or Impurity Loss – Absorption Loss – Radiation Induced Losses

Unit 5 **(13 hrs.)**

Basics of Wireless and Mobile Communications

5.1 Introduction - Present Day Mobile Communication - Radio Transmission Techniques- Cellular Concept - Operational Channels - Making a Call

5.2 Modern Wireless Communication Systems : First Generation Networks - Second Generation Networks - Tdma/Fdd - Cdma/Fdd Standard - Mobile Networks - 3g - Third Generation Networks - Bluetooth - Wireless Local Area Networks (W-Lan)

TEXT BOOKS

Ambrose, A., T. Vincent Devraj. *Elements of Solid State Electronics*, K. K. DT: Meera 1990.

Mehta. V.K. *Principles of Electronics.* New Delhi : S Chand, 1993.

Sarkar Subir Kumar. *Optical Fibres and Fibre Optic Communication Systems.* New Delhi: S Chand, 1997.

Jochen Schiller. *Mobile Communications.* Second Edition. U.K: Pearson Education, 2003.

BOOKS FOR REFERENCE

Haykin, Simon. *Digital Communications.* New Delhi: John Wiley, 1998.

Kennedy, George. *Electronic Communication Systems.* New Delhi: McGraw, 1984.

Lathi B.P. *Communication System*. New Delhi: New Delhi: Wiley, 1981.

Kaveh Pahlavan, Prasanth Krishnamoorthy. *Principles of Wireless Networks.* First Edition. U.K: Pearson Education, 2003.

JOURNAL

AEU - International Journal of Electronics and Communications

IOSR Journal of Electronics and Communication Engineering(IOSR-JECE)

PATTERN OF EVALUATION
Continuous Assessment
Total Marks: 50 Duration: 90 mins.

Section A – 5x3= 15 (All questions to be answered)
Section B – 4x5= 20 (4 out of 5 to be answered)
Section C – 1x15=15 (1 out of 2 to be answered)

Third Component:
Project
Assignments
Seminar

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered
Section C – 3 x 15 = 45 Marks (3 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

ESSENTIALS OF NANOSCIENCE

CODE: 15PH/ME/EN55 **CREDITS: 5**
L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To introduce the students to the developing field of nanoscience and technology
- To understand the methods of synthesis, characterisation techniques and applications of nanomaterials

Unit 1 **(13 hrs.)**

Introduction to Nanoscience and Nanotechnology

1.1 Introduction- Nano and Nature- Scientific Revolution, Definition of Nanotechnology, Emergence of Nanotechnology

1.2 Bulk to Nano Transition- Nanosize Effects - Size Dependent Phenomena - Bohr Excitonradius, Quantum Confinement

Unit 2 **(13hrs.)**

Types of Nanostructures and Functional Nanomaterials

2.1 Definition of a Nano System - Types of Nanocrystals-One Dimensional (1D)-Two Dimensional (2D) -Three Dimensional (3D) Nanostructured Materials - Quantum Dots (0 D) - Quantum Wire - Core/Shell Structures

2.2 Carbon (Fullerene, CNT, Graphene), Noble Metals (Au, Ag), Metal Oxides (Tio_2, Sno_2, Zno), Semiconductors (Cds, Cdse, Cdte), Magnetic Nanoparticles, Semiconductor Nanocomposites (Si:Ge)

Unit 3 **(13hrs.)**

Synthesis of Nanomaterials

3.1 Physical Method: Ball Milling, Sputter Deposition, Ion Beam Techniques.

3.2 Chemical Method: Wet Chemical Synthesis – Sol-Gel Processing, Co-Precipitation, Hydrothermal, Chemical Bath Deposition

3.3 Vapour Method: Thermal Evaporation - Chemical Vapor Deposition (CVD)

Unit 4 **(13hrs.)**

Characterisation Techniques

4.1 Powder X-Ray Diffraction

4.2 UV-Vis Absorption Spectroscopy-Photo Luminescence

4.3 Scanning Electron Microscopy(SEM)- Transmission Electron Microscopy(TEM)

Unit 5 **(13hrs.)**

Applications of Nanomaterials

5.1 Applications in Physics: Nanoelectronics, Quantum Dot and Dye Sensitized Solar Cells, Photovoltaics, Photocatalytic Applications, CNT Based Transistor and Field Emission Display

5.2 Applications in Other Fields of Science: Nanosensors, Nanomedicine, Nanocoatings, Nanopaints

TEXT BOOKS

GuoZhong Cao. *Nanostructures and Nanomaterials.* U.K: Imperial College Press, 2004.

Viswanathan. B. *Nano Materials.* India: Narosa, 2010.

Pradeep T. *Nano: The Essentials.* New Delhi: Tata Mcgraw Hill, 2007.

BOOKS FOR REFERENCE

John D. Miller. *A Hand Book on Nanophysics.* India: Dominant, 2008.

Charles P. Poole, Jr., Frank J. Owens. *Introduction to Nanotechnology.* New Delhi: Wiley, 2009.

Mick Wilson, Kamalikannangora Geoff Smith, Michelle Simmons, Burkhard Raguse. *Nanotechnology- Basic Science and Emerging Technologies*. New Delhi: Overseas, 2005.

JOURNALS

American Chemical Society publishers
Journal of Physical Chemistry (Review articles)
Chemical Reviews
Springerlink Publishers
Journal of Nanoparticle Research
Elsevier Publishers
Nano Today

WEBRESOURCE

http://www.slideshare.net/MazharLaliwala/introduction-to-nanoscience-and-nanotechnology

PATTERN OF EVALUATION

Continuous Assessment

Total Marks: 50 Duration: 90 mins.

Section A – 5x3= 15 (All questions to be answered)
Section B – 4x5= 20 (4 out of 5 to be answered)
Section C – 1x15=15 (1 out of 2 to be answered)

Third Component:

Project
Assignments
Seminar

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered
Section C – 3 x 15 = 45 Marks (3 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

B.Sc. DEGREE: BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

LASER PHYSICS

CODE: 15PH/ME/LP55 **CREDITS: 5**
L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To study the principles of Laser
- To acquaint student with different types of Lasers and their applications

Unit 1 **(13 hrs.)**

Basic Theory

1.1 Quantum Nature of Light – Energy Levels – Thermal Equilibrium - Population-Population Inversion - Absorption – Spontaneous and Stimulated Emission – Condition for Stimulated Emission

1.2 Einstein's Coefficients – Relation Between Them – Schawlow -Towne's Threshold Condition for Laser Oscillations in Terms of Population Difference

1.3 Basic Components of a Laser- Active Medium- Pumping Agents- Different Pumping Methods- Optical Resonator- Action of Optical Resonator- Optical Resonator – Cavity Configuration - Plane Parallel Cavity-Confocal Cavity-Hemispherical and Long Radius Cavity

Unit 2 **(16 hrs.)**

Rate Equations and Solid State Lasers

2.1 Laser Rate Equation- Two Level System- Three Level System- Four Level System (Qualitative Treatment Only)-Qualitative Explanation of Line Broadening Mechanism

2.2 Classification of Lasers (on the Basis of Active Medium) - Solid State Laser -Nd: YAG Laser–General Description-Structure- Energy Level Diagram – Working

2.3 Laser Beam Characteristics – Introduction- Directionality-Divergence-Coherence- Temporal and Spatial Coherence- Monochromaticity

Unit 3 **(10 hrs.)**

Gas and Liquid Lasers

3.1 Gas Lasers–Molecular Gas Laser (Carbon Dioxide Laser)-General Description-Structure - Energy Level Diagram – Working

3.2 Liquid Laser – Dye Laser - Description - Energy Level Diagram – Working

3.3 Chemical Laser– HCl Laser – CO Laser

Unit 4 (13 hrs.)

Semiconductor Laser and Holography

4.1 Semiconductor Laser – Intrinsic Semiconductor Laser - Doped Semiconductor Laser

4.2 PN Junction– Population Inversion-Energy Level Diagrams- Homojunction Laser- Diode Laser Operation- Advantages of Laser Diodes Over LED

4.3 Introduction to Holography –Recording and Reconstruction of the Image - Characteristics – Applications in Holography

Unit 5 (13 hrs.)

Applications

5.1 Laser in Industry – Drilling - Cutting – Welding – Laser Printing - Lasers in Nuclear Energy – Isotope Separation – Nuclear Fusion- Lasers in Defense- Lidar – Precision Length Measurement – Velocity Measurement

5.2 Lasers in Medicine – Cancer Therapy– Laser Eye Surgery- Laser Angioplasty

5.3 Lasers in Consumer Electronics Industry –Bar Code Scanners - Lasers in Communications-Block Diagram-Basic Principles of Optical Computers- Laser Ablations.

TEXT BOOKS

Avahanulu .M.N. *An Introduction to Lasers.* New Delhi: S Chand, 2005.

Laud B.B. *Lasers and Non – Linear Optics.* New Delhi: Wiley, 1985.

BOOKS FOR REFERENCE

Thyagarajan K. & Ghatak, A.K. *Lasers*. Chennai: Macmillan, 1981.

Wison, J & Hawkes J F B. *Optoelectronics–An Introduction.* New Delhi: Prentice Hall, 1987.

JOURNALS

Laser Physics – Springer
link.springer.com/journal/11490

Journal of Laser Applications
Scitation.aip.org/content/lia/journal/jla

WEBRESOURCE

Institute of Physics - For physics • For physicists • For all ...
www.iop.org/

Laser Physics - Complete University Guide
www.thecompleteuniversityguide.co.uk › Courses › Options

PATTERN OF EVALUATION

Continuous Assessment

Total Marks: 50 Duration: 90 mins.

Section A – 5x3= 15 (All questions to be answered)
Section B – 4x5= 20 (4 out of 5 to be answered)
Section C – 1x15=15 (1 out of 2 to be answered)

Third Component:

List of evaluation modes:
Quiz
Open book tests
Group discussion
Assignments
Seminar
Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered
Section C – 3 x 15 = 45 Marks (3 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. BRANCH III – PHYSICS

SYLLABUS
(Effective from the academic year 2015–16)

PROJECT

CODE :15PH/ME/PR55 **CREDITS : 5**
L T P : 0 0 5
TOTAL HOURS : 65

GUIDELINES FOR PROJECT

Project should be done individually. Each student will choose a topic of her interest and the student will be assigned to a supervisor

Each candidate should submit a research proposal to the Supervisor and the abstract of the project to be developed in guidance with the supervisor

The project will require practical work with the submission of a project report. It should include experimental lab work. The duration of the project work is one semester

The project report should be submitted in the prescribed format containing a minimum of 30 pages.

Each candidate has to give three periodical reviews to the internal guide on the scheduled dates prescribed by the Department

Each candidate will submit 3 hard copies of the project thesis and submit on the scheduled date. The student will appear for Viva-voce before a panel comprising External Examiner, supervisor and Head of the Department

Guidelines for Evaluation

The maximum marks for the dissertation is 100 and this will be converted to 50 marks by Controller of Examination

Internal evaluation: 50 marks

* Attendance, log book, experimental work and project report

External evaluation: 50 marks

* Project report and *viva voce*

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086
B. Sc. DEGREE : BRANCH III - PHYSICS

SYLLABUS
(Effective from the academic year 2015 -2016)

NUCLEAR AND PARTICLE PHYSICS

CODE : 15PH/MC/NP64 **CREDITS : 4**
L T P : 4 0 0
TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To learn the fundamental concepts of nuclear physics
- To acquaint students with the phenomenon of radioactivity, nuclear energy and elementary particles

Unit 1 (10 hrs.)

Nucleus

1.1 Nuclear Density - Binding Energy Per Nucleon - Packing Fraction - Nuclear Stability - Magnetic Moment - Nuclear Radius - Nuclear Charge - Nuclear Force - Meson Theory of Nuclear Force

1.2 Nuclear Model - Liquid Drop Model - Semi Empirical Mass Formula- Shell Model - Magic Numbers - Evidence (Qualitative Study Only)

Unit 2 (10 hrs.)

Radioactivity

2.1 Decay Constant - Law of Successive Disintegration - Radioactive Equilibrium Ideal Equilibrium - Secular and Transient - Radioactive Series

2.2 Alpha Decay - Tunneling Effect - Range of Alpha Article- Geiger Nuttal Law- Fine Structure - Beta Decay – K Electron Capture - Fermi Neutrino Theory - Beta Energy Spectrum, Gamma Decay – Principles of Internal Conversion - Interaction of Gamma Ray with Matter - Units of Radioactivity - Radiation Effects

Unit 3 (10 hrs.)

Accelerators and Detectors

3.1 Detectors: Geiger Muller Counter – Characteristics - Efficiency – Scintillation Counter -Nuclear Emulsion Technique

3.2 Accelerators: Linear Accelerator - Linear Hadron Collider – Cyclotron - Cyclotron Condition – Limitations – Synchrocyclotron - Electron and Proton Synchrotron

Unit 4 **(12 hrs.)**

Nuclear Energy

4.1 Nuclear Reactions - Q Value - Threshold Value - Endoergic Reaction - Transmutation by Protons, Neutrons and Alpha, Particles - Artificial Radioactivity – Radioisotopes

4.2 Nuclear Fission - Chain Reaction - Controlled and Uncontrolled - Multiplication Factor - Power Reactors - Reactors in India - Nuclear Fusion - Thermonuclear Reaction - C- N Cycle - Proton - Proton Cycle – Plasma

Unit 5 **(10 hrs.)**

Elementary Particles and Nuclear Resonance

5.1 Elementary Particles - Leptons - Mesons - Baryons - Fundamental Interactions - Their Strength – Antiparticle - Strange Particles - Quarks, Conservation Laws

5.2 Nuclear Resonance Spectroscopy: NMR - Introduction, Experimental Technique - Applications (Qualitative Study Only)

TEXT BOOKS

Murugesan .R. *Modern Physics.* New Delhi: S Chand, 2013.

Gupta A. B. and Dipak Ghosh. *Atomic and Nuclear physics.* Calcutta: Books and Allied,. 1999.

BOOKS FOR REFERENCE

Beiser, Arthur. *Concepts of Modern Physics.* New Delhi: Tata McGraw Hill, 2004.

Chang, Raymond, , *Basic principles of Spectroscopy***,** New Delhi: Tata McGraw Hill, 1971.

Ilandovan. K. *Nuclear Physics*. Chennai: MJP, 2012.

Littlefield, T A and Thorley N. *Atomic and Nuclear Physics – an Introduction.* London: Van Nostrand, 1979.

Rajam J. B. *Atomic Physics.* New Delhi: S Chand, 2000.

Ronald Gautreau and William Savin. *Schaum's Series*. New Delhi: Tata McGraw Hill, 2004.

Sanjiv Puri. *Modern Physics – Concepts and Applications.* New Delhi: Narosa, 2009.

Journals

Journal of Nuclear Physics
Physics Letters B: Nuclear, Elementary and High Energy Physics
Nuclear Engineering and Design

Web resources
www. Journal of nuclear Physics.com
Scienceenergy.gov/np
www.saha.ac.in

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Seminar
Quiz
Open book tests
Assignment
Problem solving
.

End Semester Examination

Total Marks: 100 Duration: 3 Hours

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086

B.Sc. DEGREE : BRANCH III - PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

ELECTRONICS - II

CODE: 15PH/MC/EL64 **CREDITS: 4**

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To study the design and applications of amplifiers
- To understand the basic principles of operational amplifier

Unit 1 **(10 hrs.)**

Circuit Analysis

1.1 Linear Circuit Analysis - Open and Short Circuits - the Voltage and Current Divider Circuit

1.2 Superposition Theorem - Transfer Theorems – Thevenin's Theorems – Norton's Theorem

Unit 2 **(12 hrs.)**

Transistor Biasing

2.1 Introduction – Transistor as an Amplifier in CE Arrangement - Biasing of Transistor – Faithful Amplification – Stability Factor

2.2 Methods of Transistor Biasing – Voltage Divider Bias Method -Operating Point – Load Line Analysis –DC Load Lines

Unit 3 **(10 hrs.)**

Transistor Amplifiers

3.1 Transistor Amplifiers : Single Stage Transistor Amplifier– Practical Circuit of Transistor Amplifier – Multistage Transistor Amplifier - Definition of Gain-Frequency Response- Decibel Gain and Bandwidth

3.2 RC Coupled Transistor Amplifier (No Derivation) – Operation – Frequency Response - Advantages – Disadvantages

Unit 4 **(10 hrs.)**

Special Semiconductor Devices

4.1 Field Effect Transistors – JFET – Working – Channel Conductance – Space Charge Distribution – Difference Between JFET and Bipolar Transistor – JFET as an Amplifier – IV Characteristics – Pinch Off Voltage – Parameters of JFET

4.2 Uni Junction Transistor – Construction – Operation – Inter base Resistor – Equivalent Circuit – Intrinsic Stand Off Ratio – IV Characteristics – Peak

Voltage Valley Current – Valley Voltage Negative Resistance Region – Relaxation Oscillator

Unit 5 (10 hrs.)

Operational Amplifier

5.1 Differential Amplifier – CMRR – Operational Amplifier - Functional Diagram – Virtual Ground – Non Inverting – Inverting Modes of Operation – Gain Equation

5.2 Operational Amplifier Application – Adder- Subtractor - Scale and Sign Changer – Differentiator – Integrator – Voltage Follower- Comparator. Electronic Analog Computation – Solution of Simultaneous Equations – Differential Equation

TEXT BOOKS

Gayakwad R.A. *Op. Amps & Linear Integrated Circuits.* New Delhi: Prentice, 1998.

Malvino Albert Paul and Leach Donald. *Digital Principles and Applications.* New Delhi: Tata McGraw Hill, 1981.

Malvino Albert Paul. *Electronic principles.* New Delhi: Tata McGraw Hill, 1984.

Mehta, V. *Principles of Electronics*. New Delhi: S Chand, 2014.

Sedha R.S. *Applied Electronics.* New Delhi: S Chand, 2008.

BOOKS FOR REFERENCE

Allen Mottershead. *Electronic Devices and Circuits.* New Delhi: Prentice, 1982.

Ambrose A & T Vincent Devaraj. *Elements of Solid State Electronics.* K.K. Dist: Meera 1990.

Floyd Thomas L. *Digital Fundamentals.* New Delhi: Universal, 1997.

Milmann and Halkias. *Integrated Electronics.* New Delhi: Tata McGraw Hill, 1992.

JOURNAL

IOSR – Journal of Electrical and Electronics Engineering. (IOSR – JEEE)

WEBRESOURCE
www.Electronics.com/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 mins.

Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:
List of evaluation modes:
Seminars
Quiz
Open book tests
Group discussion
Assignments
Problem solving

END SEMESTER EXAMINATION:

Total Marks: 100 Duration: 3 Hours
QUESTION PAPER PATTERN

Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

B.Sc. DEGREE : BRANCH – III – PHYSICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

QUANTUM MECHANICS AND RELATIVITY

CODE: 15PH/MC/QR64 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS:52

OBJECTIVES OF THE COURSE

- To introduce the basic concepts and fundamental phenomena of quantum physics
- To understand the relationship between space and time, mass and energy.

Unit 1 **(8 hrs.)**

Wave like Properties of Particles

1.1 Matter Waves- De Broglie Postulates- De Broglie Wavelength-Davisson and Germer Experiment-Wave -Particle Duality

1.2 Complementarity Principle- Einstein's Interpretation of Duality for Radiation- Wave Functions- Superposition Principles

1.3 Properties of Matter Waves- Relation Between Wave, Group and Particle Velocities

Unit 2 **(12 hrs.)**

Schrödinger's Equations and Applications

2.1 Time Independent Schrödinger's Equation

2.2 Applications to One Dimensional Problem: Particle in a One Dimensional Box- the Step Potential- Rectangular Potential Barrier- Examples of Barrier Penetration by Particles

2.3 Application to Three Dimensional Problems: the Free Particle- Particle in Three Dimensional Box- Degeneracy

Unit 3 **(10 hrs.)**

Quantum Mechanical Operators

3.1 Definition of an Operator- Operator Algebra- Eigen Values and Eigen Functions

3.2 Commutation Relation between Momentum and Free Particle Hamiltonian Operators

3.3 Linear Operators- Hermitian Operators- Properties- Parity Operators- Properties- Commutation Relation between Parity and Symmetric Hamiltonian Operators

Unit 4 **(12 hrs.)**

Relativity

4.1 The Experimental Background of the Theory of Relativity- Galilean Transformations- Newtonian Relativity- Attempts to Locate the Absolute Frame

4.2 Michelson-Morley Experiment- Explanation of Negative Results- Postulates of Special Theory of Relativity

4.3 Relativistic Kinematics- Lorentz Transformation Equation (Derivation) – Consequence of Lorentz Transformation Equation

Unit 5 **(10 hrs.)**

Relativistic Mechanics

5.1 (i) Length Contraction (ii) Time Dilation Experimental Verification of Length Contraction and Time Dilation Concepts- Meson Paradox- Twin Paradox

5.2 Relativistic Mechanics - Relativistic Energy and Momentum

5.3 Mass - Energy Equivalence- Evidence in Support of Mass- Energy Relation between Momentum and Energy

TEXT BOOKS

Gupta S.L., V. Kumar, H V Sharma, R C Sharma. *Quantum Mechanics.* Meerut: Jai Prakash Nath, 2004.

Prakash Sathya. *Relativistic Mechanics.* Meerut: Pragathi, 1993.

Kamal Singh ,S.P.Singh. *Elements of quantum mechanics.* New Delhi: S Chand, 2005.

BOOKS FOR REFERENCE

Beiser Arthur. *Concepts of Modern Physics,* New Delhi: Tata McGraw Hill, 2004.

Eisberg Robert, Robert Resnick. *Quantum Physics.* New York: John Wiley, 2002.

Mathews P.M. *A Text Book of Quantum Mechanics.* New Delhi:. Tata McGraw Hill, 1976.

Merzbacher Eugen. *Quantum Mechanics.* New York: John Wiley, 1999.

JOURNAL

International Journal of Quantum Information (World Scientific)
Quantum Physics News - Phys.org

WEB RESOURCE

www.quantumrelativity.com/
phys.columbia.edu/~cqft/physics.htm

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 Duration: 90 mins.
Section A – 20 x 1 = 20 Marks (All questions to be answered) in 20 minutes
Multiple choice – 8, Fill in the blanks – 4, True or False – 4, Answer briefly – 4
Section B – 3 x 5 = 15 Marks (3 out of 4 to be answered (2 problems & 2 theory))
Section C – 1 x 15 = 15 Marks (1 out of 2 to be answered)

Third Component:

List of evaluation modes:
Seminars
Quiz
Open book tests
Group discussion

Assignments
Problem solving

End Semester Examination

Total Marks: 100 Duration: 3 Hours
Section A – 30 x 1 = 30 Marks (All questions to be answered) in 30 minutes
Multiple choice – 15, Fill in the blanks – 5, True or False – 5, Answer briefly – 5
Section B – 5 x 5 = 25 Marks (5 out of 7 to be answered (5 problems & 2 theory))
Section C – 3 x 15 = 45 Marks (3 out of 5 to be answered)

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B.Sc. PHYSICS : BRANCH III – PHYSICS

SYLLABUS
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EXPERIMENTAL PHYSICS – VI

CODE: 15PH/MC/P662 **CREDITS : 2**
L T P : 0 0 3
TOTAL HOURS : 39

OBJECTIVE OF THE COURSE

- To expose the students to the technique of handling the measuring instruments

1. Spectrometer - narrow angled prism
2. Spectrometer : i –i' curve of a prism.- Stoke's formula
3. Young's modulus – Koenig's method
4. Field along the axis – Determination of H and B
5. Hysteresis – Magnetometer method – B-H curve
6. Ballistic Galvanometer – Comparison of Mutual Inductance
7. Carey Foster's Bridge- Temperature Coefficient
8. Decade Counter- 7490
9. Microprocessor- Sorting and Conversion(one)

TEXT BOOK

Ouseph,C. C., V. Srinivasan and R. Balakrishnan, *A Text Book of Practical Physics. Vol. I & II.* Chennai: S.Viswanathan, 1992.

PATTERN OF EVALUATION
CONTINUOUS ASSESSMENT

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10

END SEMESTER

Total Marks : 50 Duration : 3 Hours

Formula & Procedure	20
Observation & Calculation	20
Result & Accuracy	10