

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305**DEPARTMENT OF PHYSICS****Scheme for the *B.Sc., Students*****From 2018 – 2019 Onwards**

Semester	Courses	Hours	Credits	Total Credits
I	LC I	6	3	20
	ELC I	6	3	
	CC I – Properties of matter and Sound	5	5	
	CC II – Major Practical - I	2	2	
	AC I – Mathematics – I	9	5	
	VBC – Human value Based course	2	2	
II	LC II	6	3	20
	ELC II	6	3	
	CC III – Mechanics and Relativity	5	5	
	CC IV – Major Practical – II	2	2	
	AC II – Mathematics – II	9	5	
	ES – Environmental Studies	2	2	
III	LC III	6	3	20
	ELC III	6	3	
	CC V – Heat and Thermodynamics	5	5	
	CC VI – Major Practical - III	2	2	
	AC III – Chemistry – I	7	4	
	AC IV – Chemistry Practical – I	2	1	
	SBC I – Trouble Shooting of Basic Lab equipments	2	2	
IV	LC IV	6	3	20
	ELC IV	6	3	
	CC VII – Electricity and Magnetism	6	6	
	CC VIII – Major Practical - IV	2	2	
	AC V – Chemistry – II	7	4	
	AC VI – Chemistry Practical – II	2	1	
	EA I – Gender Studies	1	1	

V	CC IX – Optics and Spectroscopy	5	5	30
	CC X – Material Science	4	4	
	CC XI – Semiconductor devices	4	4	
	CC XII – Major Practical - V	6	6	
	EC I – Computer Programming in C	5	5	
	NMEC I – Non Conventional energy Resources (For III B. Sc., Chemistry)	2	2	
	SBC II – Trouble Shooting and Repairing of Basic Lab equipments (PRACTICAL)	2	2	
	SSD I – Soft Skills Course	2	2	
VI	CC XIII – Atomic and Nuclear Physics	4	4	30
	CC XIV – Theoretical Physics	4	4	
	CC XV – Digital Electronics and Microprocessor	4	4	
	CC XVI – Major Practical - VI	6	5	
	EC II – Nano Physics	4	4	
	EC III – Advanced Physics	4	4	
	NMEC II – Physics in everyday life (For III B. Sc., Chemistry)	2	2	
	SBC III – Physics for Competitive Examinations	2	2	
	EA II	-	1	
			TOTAL	140

HOD of Physics

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE : 18 PH 101

CLASS : I-B.Sc., PHYSICS

CREDIT: 5

HOURS: 5 / Week

Semester – I

CC I – PROPERTIES OF MATTER AND SOUND

(For candidates admitted from 2018 onwards)

UNIT – I: Elasticity

Hooke's law – Stress–Strain diagram – Different moduli of elasticity – Relation between elastic moduli – Poisson's ratio – Work done in stretching a wire – Twisting couple on a cylinder – Rigidity modulus by static torsion – Work done in twisting a wire – Torsion pendulum – Period of oscillation – Determination of rigidity modulus and moment of inertia.

UNIT – II: Bending of Beams

Beam – Expression for bending moment – Cantilever – Expression for the depression of the loaded end of a Cantilever – Young's modulus by cantilever depression – Oscillation of a cantilever – Theory and experiment to find Young's modulus by Non-uniform bending and Uniform bending (Pin and microscope) – I-section girders.

UNIT – III: Surface tension and Viscosity

Surface tension – Surface tension on kinetic theory – Excess pressure inside a liquid drop and soap bubble – Excess pressure inside a curved liquid surface – Experimental determination of surface tension: Jaegar's method and Drop weight method – Variation of surface tension with temperature.

Viscosity – Streamline flow and turbulent flow – Poiseuille's formula – Poiseuille's method to determine the co-efficient of viscosity of a liquid – Terminal velocity – Stoke's method – Variation of viscosity with temperature – Lubricants.

UNIT – IV: Waves and Oscillations

Simple harmonic motion – Composition of SHM – Lissajous figures – Free, Damped, Forced vibrations and Resonance – Intensity of sound – Expression for intensity of sound – Decibel – Loudness of sound – Noise pollution.

UNIT – V: Ultrasonics and Acoustics

Ultrasonics – Production by Piezo-electric crystal method and Magnetostriction method – Detection – Properties – Application to Science, Industry and Medicine.

Acoustics – Reverberation – Reverberation time – Sabine's formula for reverberation time – Absorption coefficient – Acoustics of buildings – Factors affecting the acoustics of buildings – Sound distribution in an auditorium.

Books for Study:

1. R. Murugesan and Kiruthiga Sivaprasath – *Properties of matter and Acoustics* – S.Chand & Co. Pvt. Ltd., New Delhi (Unit-I to V).
2. BrijLal & Subramaniam – *Properties of matter* - Eurasia Publishing Co., New Delhi (Unit-I, II and III).
3. BrijLal & Subramaniam – *Text book of Sound* – Vikas Publishing House, New Delhi (Unit-IV and V).

Books for Reference:

1. R.Murugesan – *Properties of matter* – S.Chand & Co. Pvt. Ltd., New Delhi.
2. D.S.Mathur – *Elements of Properties of matter* – Shyamlal Charitable Trust, New Delhi.
3. H.R. Gulati – *General properties of matter* – R.Chand & Co.
4. BrijLal & N.Subramaniam – *Waves and oscillations* – Vikas Publishing House, New Delhi.
5. M.N.Srinivasan – *Text book of Sound* – Himalaya Publications.

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks : 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**(A subdivision in ANY ONE question Should be a problem)****Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 PHP 102

CLASS: I - B.Sc., Physics

CREDIT: 2

HOURS: 2 / Week

Semester – I

CC II – MAJOR PRACTICAL – I

(For candidates admitted from 2018 onwards)

(Any SEVEN experiments)

1. Young's modulus of the material of a beam –
Non-uniform bending method– Pin & Microscope.
2. Young's modulus of the material of a beam –
Cantilever – Scale & Telescope.
3. Moment of Inertia – Torsion Pendulum.
4. Figure of merit of a Table Galvanometer.
5. Surface tension of a given liquid – Capillary rise method.
6. Internal resistance of a cell – Potentiometer.
7. Thermo emf by Direct Deflection method.
8. Co-efficient of viscosity – Stoke's method.
9. Viscosity of a liquid – Poiseuille's method- Variable pressure head method.
10. Long focus convex lens - f , R , refractive index-determination.
11. Concave lens – Focal length determination.
12. Verification of three laws of transverse vibrations – Sonometer.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PH 203

CLASS: I B.Sc., PHYSICS

CREDIT: 5

HOURS: 5 / Week

Semester – II

CC III – MECHANICS AND RELATIVITY

(For candidates admitted from 2018 onwards)

UNIT – I: Projectile, Impulse and Impact

Projectiles – Particle projected in any direction – Parabolic path of projectile – Range of projectile on an inclined plane – Impulse of a force – Laws of impact – Direct impact between two smooth spheres – Oblique impact between two smooth spheres – Impact of a smooth sphere on a smooth horizontal plane – Loss of kinetic energy due to direct and oblique impact.

UNIT – II: Dynamics of rigid bodies

Moment of Inertia – Kinetic energy and angular momentum of a rotating body – Theorems of perpendicular and parallel axes – Moment of Inertia of a Circular disc and Solid Sphere – Moment of inertia of a flywheel – Centripetal and centrifugal forces – Hodograph – Expression for normal acceleration – Motion of a cyclist along a curved path.

UNIT – III: Gravitation

Newton's law of gravitation – Mass and density of Earth – Deduction of Newton's law of gravitation from Kepler's laws – Boy's method of determination of G – Gravitation potential and field due to Spherical shell and Solid sphere – Variation of 'g' with altitude, depth and rotation of Earth – Orbital velocity – Escape velocity – Rocket and Jet plane.

UNIT – IV: Gravity and Floating bodies

Compound pendulum – Centre of suspension and oscillation – Minimum period - Kater's pendulum – Centre of gravity – Centre of gravity of a Solid hemisphere and Hollow hemisphere – Floating body – Meta centre – Condition for stability – Determination of meta centric height of a ship – Equation of continuity – Euler's equation for unidirectional flow – Bernoulli's theorem – Aeroplane wings.

UNIT – V: Relativity

Frame of reference – Inertial frames – Galilean transformations – Michelson-Morley experiment and its significance – Einstein's theory of relativity – Lorentz transformation equations – Lorentz-Fitzgerald contraction – Time dilation – Composition of velocities – Variation of mass with velocity – Einstein's Mass-energy relation – Energy-momentum relation.

Books for study:

1. M. Narayanamoorthy & Nagaratnam – *Dynamics* (Unit-I, II, IV and V).
2. Brijlal Subramanyam – *Properties of matter* (Unit-II, III and V).
3. R. Murugesan – *Mechanics and Mathematical methods* (Unit-IV).
4. M. Narayanamoorthy & Nagaratnam – *Statics, hydrostatics and hydrodynamics* (Unit-IV).

Books for Reference:

1. R. Murugesan – *Properties of matter* (Unit-III).
2. J.B.Rajam – Modern Physics.
3. D.S.Mathur – Mechanics.
4. Engineering mechanics – Vaidyanathan. S

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

(A subdivision in ANY ONE question should be a problem)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

**A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS**

CODE: 18 PHP 204

CLASS: I B.Sc., Physics

CREDIT: 2

HOURS: 2 / Week

Semester – II

CC IV – MAJOR PRACTICAL – II

(For candidates admitted from 2018 onwards)

(Any SEVEN experiments)

1. Young's modulus of the material of a beam – Uniform bending method
– Pin & Microscope.
2. Rigidity modulus of the material of a rod – Static Torsion – Scale & Telescope.
3. Determination of 'g' and 'k' – Compound Pendulum.
4. Surface Tension and Interfacial Surface Tension – Drop weight method.
5. Co-efficient of viscosity – Graduated Burette method – Constant pressure head method.
6. Specific Resistance of a given coil – Meter Bridge.
7. Determination of Thermal Conductivity of a bad conductor – Lee's disc method.
8. Thickness of thin material – Air Wedge.
9. Comparison of viscosities of two given liquids – Capillary flow method.
10. Rigidity modulus of the material of a wire – Torsion Pendulum
11. Coefficient of Viscosity of highly viscous liquid – Searle's Viscometer
12. Emissive power of a surface – Spherical Calorimeter.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 APH 101

CLASS: I B.Sc., Maths

CREDITS: 4

HOURS: 7/Week

Semester – I

AC - I – ALLIED PHYSICS – I

(For candidates admitted from 2018 onwards)

UNIT – I: Properties of Matter

Rigidity modulus – Couple per unit twist – Torsion pendulum – Static torsion – Bending moment – Cantilever – Theory and experiment – Young's modulus – Uniform and Non-uniform bending – Surface Tension – Surface tension by Drop weight method – Viscosity – Poiseuille's formula – Burette method for determining the co-efficient of viscosity of a liquid.

UNIT – II: Mechanics

Gravitation – Newton's law – Determination of G by Boy's method – Centre of gravity – Centre of gravity of solid and hollow hemispheres – Moment of Inertia – M.I of solid cone – K.E of rotation – Acceleration of a body rolling down an inclined plane – Compound Pendulum – Determination of 'g'.

UNIT – III: Thermal Physics

Joule - Kelvin effect and experiment – Liquefaction of air – Linde's method – Uses of liquid air – Thermal conductivity – Searle's method – Lee-Charlton method – Black body – Kirchoff's law of radiation – Lummer and Kurlbaum bolometer – Thermopile – Boy's radio micrometer.

UNIT – IV: Optics

Spherical and chromatic aberration in lenses – Methods of minimizing spherical and chromatic aberration in lenses – Interference – Air wedge and Newton's rings – Diffraction – Plane transmission grating – Normal incidence – Polarization – Optical activity – Specific rotation – Laurent's half shade polarimeter – Specific rotation of sugar solution.

UNIT – V: Ultrasonics & Acoustics

Ultrasonics – production – Piezo-electric method – Detection – Properties – Applications – Acoustics of buildings – Reverberation – Sabine's formula and its importance – Factors affecting the acoustics of buildings.

Velocity of sound in gases – Newton – Laplace's formula – Effect of pressure, temperature and humidity on the velocity of sound in gas.

Books for Study:

1. Mechanics – D.S.Mathur.
2. Properties of matter – D.S.Mathur.
3. Heat & Thermodynamics – BrijLal & Subramaniam.
4. Text book of Optics – BrijLal & Subramniam.
5. Properties of matter and Acoustics – R.Murugesan.

Books for Reference:

1. Properties of Matter – R. Murugesan and Kiruthiga Sivaprasath – S.Chand & Co. Pvt. Ltd., New Delhi.
2. Heat and Thermodynamics – D.S.Mathur
3. Optics and Spectroscopy – R. Murugesan and Kiruthiga Sivaprasath – S.Chand & Co., New Delhi (2006).
4. Text book of Sound – M.N.Srinivasan – Himalaya Publications.

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks : 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APHP 102

CLASS: I B.Sc., Maths

CREDITS: 1

HOURS: 2 / Week

Semester – I

AC – II -ALLIED PHYSICS PRACTICAL – I

(For candidates admitted from 2018 onwards)

(Any SEVEN experiments)

1. Young's modulus of the material of a beam
Non-uniform bending – Pin & Microscope method.
2. Young's modulus of the material of a beam
Cantilever – Scale & Telescope
3. Rigidity modulus of the material of a wire by Torsional Pendulum
4. Surface tension and Interfacial Tension by Drop weight method
5. Co-efficient of viscosity – Burette method - Poiseuille's formula
6. Viscosity of highly viscous liquid - Stoke's method
7. Potentiometer – Calibration of low range voltmeter
8. Spectrometer – Refractive index of the solid prism
9. Air wedge – Thickness of a thin wire
10. Figure of merit – Table galvanometer
11. Metre Bridge – Specific Resistance
12. Acceleration due to gravity – Compound pendulum

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 APH 203

CLASS: I B.Sc., Maths

CREDITS: 4

HOURS: 7/Week

Semester – II

AC - III – ALLIED PHYSICS – II

(For candidates admitted from 2018 onwards)

UNIT – I: Electricity

Gauss's theorem and its applications – Capacitor – Energy of charged capacitor – Loss of energy due to sharing of charges – Capacity of parallel plate capacitor – Types of capacitors – Kirchoff's laws – Wheatstone's bridge – Carey Foster's bridge – Determination of temperature co-efficient of resistance – Potentiometer – Calibration of low range voltmeter.

UNIT – II: Magnetism

Magnetic induction – Intensity of magnetization – Permeability and susceptibility – Cycle of magnetization – Hysteresis – B-H curve – Biot-Savart law – Magnetic field intensity due to long straight conductor, circular coil and solenoid carrying current – Theory of B.G. – Figure of merit – Damping correction.

UNIT – III: Modern Physics

Positive rays – Dempster's mass spectrograph – Determination of masses of the isotopes – Classification of nuclei – General properties of nucleus – Nuclear detectors – Wilson's cloud chamber – Accelerators – Linear accelerators – Cyclotron – Classification of neutrons – Neutron detection – Nuclear fission and fusion – Thermonuclear reactions.

UNIT – IV: Analog Electronics

PN junction diode – Forward and Reverse biasing – Characteristics of junction diode – Zener diode – Zener diode as voltage regulator – Transistor – Working – Configuration – CB and CE modes – Transistor biasing – CE single stage transistor amplifier – Frequency response – Hartley oscillator.

UNIT – V: Digital Electronics

Number system (conversions for whole numbers) – Binary to Decimal – Decimal to Binary – Hexa Decimal to binary- Decimal to Hexa Decimal- 1's and 2's complement – Basic logic gates (using discrete components) – Universality of NAND and NOR gates – De-Morgan's theorem – Boolean algebra – simplifications – Half and full adders – Half and full subtractors.

Book for study:

1. Allied Physics – R.Murugesan, S.Chand & Co., Ltd.
2. Allied Physics I & II – Sundaravelusamy

Books for Reference:

1. Electricity and magnetism – R.Murugesan, S.Chand & Co., Ltd.
2. Modern Physics - R.Murugesan, S.Chand & Co., Ltd.
3. Principles of Electronics – V.K.Metha, S.Chand & Co., Ltd.
4. Modern Digital Electronics – R.P. Jain, Tata McGraw Hill Publications.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks : 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 APHP 204

CLASS: I B.Sc., Maths

CREDITS: 1

HOURS: 2 / Week

Semester – II

AC – IV -ALLIED PHYSICS PRACTICAL – II

(For candidates admitted from 2018 onwards)

(Any SEVEN experiments)

1. Young's modulus of the material of a beam -
Uniform bending – Pin & Microscope method
2. Rigidity modulus of the material of a rod - Static Torsion
3. Moment of inertia – Torsional pendulum
4. Potentiometer – Calibration of low range ammeter
5. Potentiometer – Internal resistance of a primary Cell
6. Spectrometer – Refractive index of a Liquid
7. Newton's rings – Radius of curvature
8. Carey Foster's bridge – Specific Resistance
9. Basic logic Gates using discrete components
10. Thermo-emf by direct deflection method
11. Characteristics of PN Junction diode
12. Characteristics of Zener diode

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PH 305

CLASS: II - B.Sc., PHYSICS

CREDITS: 5

HOURS: 5/Week

Semester – III

CC V – HEAT AND THERMODYNAMICS

(For candidates admitted from 2018 onwards)

UNIT – I: Calorimetry

Specific heat: Specific heat capacity of solids – Nernst vacuum calorimeter – Newton's law of cooling – Specific heat capacity of liquid – Joule's electrical method – Specific heat of capacity of gases – C_v by Joly's differential steam calorimeter method – C_p by Regnault's method.

UNIT – II: Laws of thermodynamics

Zeroth & First law of thermodynamics – Isothermal and Adiabatic process – Work done during an isothermal and an adiabatic process – Reversible and Irreversible process – Second law of thermodynamics – Carnot's engine – Diesel engine – Entropy (concept only) – Third law of thermodynamics – Maxwell's thermodynamical relations.

UNIT – III: Liquefaction of gases

Joule-Kelvin effect – Porous plug Theory & Experiment – Liquefaction of Oxygen (Cascade process) – Liquefaction of air (Linde's process) – Liquefaction of hydrogen – Liquefaction of helium (K.Onne's method) – Electrolux refrigerator.

UNIT – IV: Transmission of heat

Introduction – Coefficient of thermal conductivity – Rectilinear flow of heat along a bar – Forbes method of finding K – Lee and Charlton's method for bad conductors – Black body radiation – Statement and derivation of Stefan's law – Derivation of Newton's law of cooling from Stefan's law.

UNIT – V: Statistical thermodynamics

Statistical equilibrium – Probability theorems in statistical thermodynamics – Maxwell-Boltzmann distribution law – MB distribution in terms of temperature – Ideal gas – Quantum statistics – Phase space – Fermi-Dirac distribution law – Bose-Einstein distribution law.

Book for Study:

1. Brijlal and N. Subramanyam – Heat and thermodynamics, S. Chand & Co.

Books for Reference:

1. D.S.Mathur – Heat and Thermodynamics.
2. Gupta and Kumar – Elementary statistics.
3. Sathya Prakash & C.Agarwal – Statistical Mechanics.
4. S.S. Singhal & J.P. Agarwal – Heat and Thermodynamics.
5. B. Dayal & H.P. Verma – Heat and Thermodynamics.
6. NPTEL Lecture Series.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section - A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit - I
- 3 & 4. From Unit - II
- 5 & 6. From Unit - III
- 7 & 8. From Unit - IV
- 9 & 10. From Unit - V

Section - B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) - From Unit - I
- 12. (a) or (b) - From Unit - II
- 13. (a) or (b) - From Unit - III
- 14. (a) or (b) - From Unit - IV
- 15. (a) or (b) - From Unit - V

Section - C (3 X 10 = 30 Marks)

Answer any THREE questions

(A subdivision in ANY ONE question should be a problem)

- 16. From Unit - I
- 17. From Unit - II
- 18. From Unit - III
- 19. From Unit - IV
- 20. From Unit - V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PHP 306

CLASS: II-B.Sc., PHYSICS

CREDIT: 2

HOURS: 2 / Week

Semester – III

CC VI – MAJOR PRACTICAL - III

(For candidates admitted from 2018 onwards)

(Minimum Seven experiments)

1. Calibration of Low Range Voltmeter – Potentiometer.
2. Refractive index of a solid prism – Spectrometer.
3. Characteristics of a Zener Diode
4. Specific Heat Capacity of a given liquid – Newton’s Law of Cooling.
5. Post office Box - Measurement of specific resistance and laws of resistances.
6. Moment of a magnet – Field along the axis of a coil.
7. Specific Resistance of a given coil – Carey Foster Bridge.
8. Radius of Curvature of a given lens – Newton’s Rings.
9. Thermistor – Digital multimeter
10. Youngs modulus of the material - Cantilever oscillation method.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 SPH 301

CLASS: II B.Sc., PHYSICS

CREDITS: 2

HOURS: 2/Week

Semester – III

SBC I – TROUBLE SHOOTING OF BASIC LAB EQUIPMENTS

(For candidates admitted from 2018 onwards)

UNIT-I

Transformers: Principle – types of transformers – low voltage – high voltage – fly back– isolation – variac– testing of transformers – common faults in transformers – rewinding of transformers – Trouble shooting Voltmeter, Ammeter and Galvanometer.

UNIT-II

Resistor: Introduction – types of resistors– carbon composition – metal – wire wound – thick film – colour coding – failures in fixed resistors – testing of resistors – variable resistors.

UNIT-III

Capacitor: Introduction – mica – ceramic – plastic – electrolytic – Aluminum titanium foil capacitor – performance of capacitors.

UNIT-IV

Failures in capacitors: Testing of capacitors – precautions while testing capacitor – variable capacitor and types.

UNIT-V

Semiconductor devices: Diodes and Transistors – causes of failure – types of failure – diode testing procedure – bipolar transistor testing procedure – Testing the biasing of transistors.

BOOKS FOR STUDY:

1. R. S. Khandpur – Troubleshooting Electronic equipments – Tata Mc Graw Hill.
2. A. K. Sawhney – A course in Electronic Measurements and Instrumentations – Dhanpat Rai and company (P) limited.

BOOKS FOR REFERENCE:

1. Electronic testing and fault diagnosis – George C. Love day, Wheeler publications.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section– A (5 x 15 = 75)

**Answer any FIVE Questions out of EIGHT questions
Without Omitting any Unit**

DEPARTMENT OF PHYSICS

CODE: 18 PH 407

CLASS: II-B.Sc., PHYSICS

CREDITS: 6

HOURS: 6/Week

Semester – IV

CC VII – ELECTRICITY AND MAGNETISM

(For candidates admitted from 2018 onwards)

UNIT – I: Electrostatics

Coulomb's Law – Electric field due to a point charge – Gauss's Law and its applications – Coulomb's theorem – mechanical force experienced by unit area of a charged conductor - Electric Potential – Potential at a point due to a uniformly charged conducting sphere – Principle of a capacitor – Types of capacitors.

UNIT – II: Magnetic properties of materials

Magnetic induction – Magnetization – Relation between the three magnetic vectors B, H and M – Magnetic susceptibility – Magnetic Permeability – Properties of Dia, Para and Ferromagnetic materials – Experiment to draw B-H curve (Ballistic method) – Energy loss due to hysteresis – Importance of hysteresis curves.

UNIT – III: Current Electricity

Biot-Savart Law – Magnetic induction at a point due to a circular coil - Laplace's law – Field along the axis of a circular coil – Theory of Moving coil ballistic galvanometer .

Kirchoff's laws – Condition for Wheatstone's bridge – Carey Foster's bridge-specific resistance and temperature coefficient of resistance – Potentiometer – Principle – Calibration of ammeter and voltmeter (Low & High range).

UNIT – IV: Electromagnetic Induction

Faraday's Laws of electromagnetic induction – Self induction – Self inductance of a long solenoid – Determination of self inductance by Rayleigh's method– Mutual induction – Mutual inductance between two coaxial solenoids – Experimental determination of mutual inductance – Coefficient of coupling.

UNIT – V: DC & AC Circuits

Growth and decay of current and charge in an LR & CR circuit – Determination of high resistance by leakage method – Growth and decay of charge L, C and R – Peak, Mean and Root mean square value of AC – AC circuit containing LCR series and parallel resonant circuits – Power in ac circuits containing L, C & R.

Books for Study:

1. Brijlal & Subramanyam – Electricity and Magnetism – Radan Prakashan Mandir.
2. R. Murugesan – Electricity and Magnetism – S.Chand & co.,

Books for Reference:

1. Narayanamurthy – Electricity and Magnetism.
2. D.N.Vasudeva – Fundamentals of Magnetism and Electricity – S.Chand & Co.
3. K.K. Tewari – Electricity and Magnetism.
4. I.V. Savelyev – Electricity, Waves, Optics.

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks: 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**Answer any THREE questions****(A subdivision in ANY ONE question should be a problem)**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PHP 408

CLASS: II-B.Sc., PHYSICS

CREDIT: 2

HOURS: 2 / Week

Semester – IV

CC VIII – MAJOR PRACTICAL – IV

(For candidates admitted from 2018 onwards)

(Minimum seven Experiments)

1. Calibration of an Ammeter – Potentiometer.
2. Refractive index of a liquid using hollow prism – Spectrometer.
3. Bridge Rectifier.
4. Specific Heat Capacity of a given liquid – Joule's Calorimeter.
5. Refractive index of the given liquid-Newton's ring.
6. Determination of ' B_H ' – Field along the axis of a coil.
7. Percentage of Regulation – Zener Regulated Power Supply.
8. Series & Parallel Resonance Circuits – LCR.
9. Basic logic gates – Discrete components
10. Temperature co-efficient of resistance of the material of a coil – Post Office Box

DEPARTMENT OF PHYSICS

CODE: 18 APCH 303/305

CLASS: II B.Sc., Chemistry

CREDITS: 4

HOURS: 7 / Week

Semester - III

AC - I - ALLIED PHYSICS - I

(For candidates admitted from 2018 onwards)

UNIT - I: Mechanics

Centre of Gravity: Centre of Gravity of a solid hemisphere – Hollow hemisphere – Centre of Gravity of a solid cone – Centre of Gravity of a solid tetrahedron – Moment of inertia – MI of solid cone.

Floating bodies: Stability of Floating bodies – Meta centre – Determination of Metacentric height of a ship.

UNIT - II: Properties of matter

Elasticity: Stress – Strain – Young's modulus – Behaviour of wire under progressive tension – Bending of beams – Expression for the bending moment – Measurement of Young's modulus – Nonuniform bending and Uniform bending.

Viscosity: Determination of coefficient of viscosity of a liquid (Variable pressure head).

Surface Tension: Drop weight method

UNIT - III: Thermal Physics

Radiation: Black body – Stefan's law – Newton's law of cooling – Newton's law of cooling from Stefan's law – Experimental determination of Stefan's constant – Wien's displacement law – Rayleigh – Jean's law – Planck's law.

Heat Conduction: Coefficient of Thermal Conductivity – Determination of Thermal Conductivity of a bad Conductor by Lee's disc method.

UNIT - IV: Optics

Geometrical Optics: Spherical aberration of a thin lens – Methods of reducing spherical aberration

Interference: Introduction – Air wedge – Newton's rings – Determination of wavelength.

Diffraction: Plane diffraction Grating – Theory of plane transmission Grating

UNIT - V

Acoustics: Acoustics of buildings – Reverberation – Sabine's formula (Qualitative study) – its importance – Factors affecting audibility.

Sound: Velocity of sound in gases – Newton – Laplace's formula – Effect of pressure, temperature and humidity on the velocity of sound in gas - Ultrasonics – Production - Piezo electric method - properties and applications.

Books for Study:

1. R. Murugesan – Allied Physics papers I & II.
2. Sundaravelusamy - Allied Physics I & II.

Books for Reference:

1. R. Murugesan and Kiruthiga Sivaprasath – Properties of Matter – S. Chand & Co. Pvt. Ltd., New Delhi.
2. D.S. Mathur – Heat and Thermodynamics.
3. R. Murugesan and Kiruthiga Sivaprasath – Optics and Spectroscopy – S.Chand & Co., New Delhi (2006).
4. M.N.Srinivasan – Text book of Sound – Himalaya Publications.

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks: 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APCH 405/407

CLASS: II B.Sc., Chemistry

CREDITS: 4

HOURS: 7 / Week

Semester – IV

AC – III -ALLIED PHYSICS – II

(For candidates admitted from 2018 onwards)

UNIT – I: Electrostatic

Gauss's theorem and its application-Capacitor – Energy of charged capacitor – Loss of energy due to sharing of charges – Kirchoff's laws – Wheatstone's bridge – Carey Foster's bridge – Determination of temperature coefficient of resistance.

UNIT – II: Magnetism

Magnetic induction – Intensity of magnetization – Permeability and Susceptibility –Types of magnetic materials- properties of para, dia and ferromagnetic materials - B-H curve by magnetometer method – Biot-Savart law – Magnetic field at a point on the axis of a circular coil carrying current.

UNIT – III: Atomic and Nuclear physics

Bohr model – Vector atom model - Positive rays – Dempster's mass spectrograph – Determination of mass of the isotopes – Cyclotron- Classification of nuclei – General properties of nucleus – Nuclear detectors – Wilson's cloud chamber.

UNIT – IV: Electronics

PN junction diode – Forward and Reverse biasing – Characteristics – LED – Photo diode - photo voltaic cell - photo multiplier tubes - photo transistor - Zener diode – Zener diode as voltage regulator – Transistor – Working – Characteristics – CB and CE modes – Transistor biasing -

UNIT – V: Digital electronics

Number system – Binary, Decimal, Hexa Decimal – Conversions – Basic logic gates – using discrete components – Universality of NAND and NOR gates – De-Morgan's theorem – Boolean algebra – Simplification of Half and full adders – Half and full subtractors.

Book for study:

1. R. Murugesan – Allied Physics papers I & II.
2. Sundaravelusamy - Allied Physics I & II.

Books for Reference:

1. R.Murugesan – Electricity and magnetism – S.Chand & Co., Ltd.
2. R.Murugesan – Modern Physics – S .Chand & Co., Ltd.
3. V.K.Metha – Principles of Electronics – S.Chand & Co., Ltd.
4. R.P. Jain – Modern Digital Electronics – Tata McGraw Hill Publications.
5. Brijilal & Subramanian – Electricity and Magnetism – Radan Prakashan Mandir.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) – From Unit – I
- 12. (a) or (b) – From Unit - II
- 13. (a) or (b) – From Unit - III
- 14. (a) or (b) – From Unit - IV
- 15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

- 16. From Unit – I
- 17. From Unit – II
- 18. From Unit – III
- 19. From Unit – IV
- 20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APCS 303

CLASS: II-B.Sc., Comp. Science

CREDITS: 4

HOURS: 7/Week

Semester – III

AC – V - Allied Physics – I

(For candidates admitted from 2018 onwards)

UNIT – I: ELECTRICITY I

Gauss's law-field due to a charged plane, sphere and cylinder-capacity of a parallel plate and spherical condenser - condensers in series and parallel, with theory.

UNIT – II: ELECTRICITY II

Ohm's law- resistance in series and parallel- Kirchoff's law- Wheatstone's bridge - Carey Foster's bridge- determination of temperature co-efficient of resistance- heating effect of electric current – Joule's Calorimeter.-Principle of potentiometer – calibration of voltmeter and ammeter (Low range).

UNIT – III: ELECTROMAGNETIC INDUCTION

Faraday's laws of electromagnetic induction- self induction- self inductance of a long solenoid - determination of self inductance by Rayleigh's method- mutual induction- mutual inductance between two coaxial solenoids- Eddy current and its applications. - AC circuit containing LCR series and parallel resonant circuits (No derivation).

UNIT – IV: ELECTRONICS I

Semiconductors- doping- PN junction diode – characteristics – Avalanche breakdown - Full wave bridge rectifier – working – Ripple factor and efficiency – Filters- capacitor and π filters- Zener diode – V-I characteristics– Zener breakdown – Regulated Power supply using Zener Diode.

UNIT – V: ELECTRONICS II

Transistor – Working – CE & CB characteristics – Need for biasing- Potential divider biasing- Transistor amplifier – single stage amplifier – Frequency response – Feedback principle – negative feedback – Its Advantages – Positive feedback – Barkhausen Criterion – Hartley and Colpitts oscillator (No derivation).

Books for Study:

1. Brijlal and N. Subrahmayam - Electricity and magnetism.
2. R.Murugesan - Electricity and magnetism.
3. V.K Metha – Principles of electronics.

Books for Reference:

1. Vincent Ambrose – Principles of Electronics.
2. G.K. Mithal – Basic electronics and solid state.
3. B. Basavaraj and H.N. Shivasankar – Basic electronics and solid state.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section - A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit - I
- 3 & 4. From Unit - II
- 5 & 6. From Unit - III
- 7 & 8. From Unit - IV
- 9 & 10. From Unit - V

Section - B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) - From Unit - I
- 12. (a) or (b) - From Unit - II
- 13. (a) or (b) - From Unit - III
- 14. (a) or (b) - From Unit - IV
- 15. (a) or (b) - From Unit - V

Section - C (3 X 10 = 30 Marks)

Answer any THREE questions

- 16. From Unit - I
- 17. From Unit - II
- 18. From Unit - III
- 19. From Unit - IV
- 20. From Unit - V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APCS 405

CLASS: II-B.Sc., Comp. Science

CREDITS: 4

HOURS: 7/Week

Semester – IV

AC – VII - Allied Physics – II

(For candidates admitted from 2018 onwards)

UNIT – I: OP-AMP

Operational Amplifier – Characteristics – CMRR – Slew Rate – Inverting and Non-inverting Amplifier – Adder, Subtractor, Integrator and Differentiator – Comparator – Digital to Analog Conversion – Binary Weighted Resistor Method – Analog to Digital Conversion – Successive Approximation Method.

UNIT – II: DIGITAL ELECTRONICS

Logic Gates – Construction of basic logic Gates using Discrete Components – Universal Gates - Construction – Boolean Algebra – Demorgan's Theorem – Verification – Simplification of Boolean Expression using Boolean Laws and K Map (up to four variables only). Half Adder, Half Subtractor, Full Adder & Full Subtractor.

UNIT – III: FIBRE OPTICS

Fibre Optics – Types of optical fibre – Propagation of Light through an Optical Fibre – Numerical Aperture – Acceptance Angle – Total Internal Reflection - Fibre Optic Communication System – Losses in optical fibers - Advantages and Disadvantages – Applications.

UNIT – IV: LASER

Laser: Principle and Characteristics – Induced Absorption – Spontaneous Emission – Stimulated Emission – Population Inversion – Pumping – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications.

UNIT – V: INTEGRATED CIRCUITS

Integrated Circuits – Advantages and disadvantages - Classification of ICs – fabrication of Monolithic IC – Diode, Transistor, Resistor and Capacitor – fabrication of memory devices – ROM and RAM.

BOOKS FOR STUDY:

1. B. L. Theraja – Basic electronics and solid state.
2. V. K. Metha – Principle of Electronics.
3. Albert Paul Malvino and Donald P. Leach – Digital Principles and Applications.
4. Dr. N. Subramanyam, Brijlal, Dr. M.N. Avadhanulu – A Textbook of Optics

BOOKS FOR REFERENCE:

1. Vincent Ambrose – Principles of Electronics.
2. G.K. Mithal – Basic electronics and solid state.
3. B. Basavaraj and H.N. Shivasankar – Basic electronics and solid state.
4. R.P. Jain and M.M.S. Anand – Digital Electronics Practice Using Integrated Circuits.
5. K. Meena – Principles of Digital electronics.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APCSP 304

CLASS: II-B.Sc., Comp. Science

CREDITS: 1

HOURS: 2 / Week

Semester – III

AC – VI - ALLIED PHYSICS PRACTICAL – I

(For candidates admitted from 2018 onwards)

(Minimum seven Experiments)

1. Potentiometer – Calibration of low range voltmeter.
2. Meter Bridge – specific resistance
3. Figure of merit – Table galvanometer.
4. Thermo emf – Thermoelectric power - Direct deflection method
5. Zener diode characteristics.
6. Junction diode characteristics.
7. Voltage doubler
8. LCR – Series Resonant Circuit
9. Zener regulated power supply - Bridge Rectifier
10. Basic logic gates - Discrete components

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APCSP 406

CLASS: II-B.Sc., Comp. Science

CREDITS: 1

HOURS: 2 / Week

Semester – IV

AC – VIII - ALLIED PHYSICS PRACTICAL - II

(For candidates admitted from 2018 onwards)

(Minimum seven Experiments)

1. Potentiometer – Calibration of low range Ammeter.
2. Carey Foster's Bridge – Specific Resistance
3. Op-amp-Adder & Subtractor
4. Op-amp-D/A converter
5. Logic Gates (AND, OR, NOT, NAND and NOR) using IC's
6. RTL gates – NAND and NOR
7. NAND as Universal gate using IC's
8. NOR as Universal gate using IC's
9. LCR – Parallel Resonant Circuit
10. Voltage Tripler

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APP 304/306

CLASS: II B.Sc., Chemistry

CREDITS: 1

HOURS: 2 / Week

Semester - III

AC - II -ALLIED PHYSICS PRACTICAL - I
(For candidates admitted from 2018 onwards)

(Any SEVEN experiments)

1. Young's modulus of the material of a beam
Non-uniform bending – Pin & Microscope method.
2. Rigidity modulus of the material of a wire by Torsional Pendulum
3. Surface tension and Interfacial Tension by Drop weight method
4. Co-efficient of viscosity – Burette method - Poiseuille's formula
5. Viscosity of highly viscous liquid - Stoke's method
6. Figure of merit – Table galvanometer
7. Potentiometer – Calibration of low range voltmeter
8. Metre Bridge – Specific Resistance of a coil
9. Spectrometer – Refractive index of the solid prism
10. Air wedge – Thickness of a thin wire

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 APP 406/408

CLASS: II B.Sc., Chemistry

CREDITS: 1

HOURS: 2 / Week

Semester - IV

AC - IV -ALLIED PHYSICS PRACTICAL - II

(For candidates admitted from 2018 onwards)

(Any SEVEN experiments)

1. Young's modulus of the material of a beam -
Uniform bending – Pin & Microscope method
2. Rigidity modulus of the material of a rod - Static Torsion
3. Compound pendulum – Determination of 'g'
4. Potentiometer – Calibration of low range ammeter
5. Spectrometer – Refractive index of a Liquid
6. Newton's rings – Radius of curvature
7. Carey Foster's bridge – Specific Resistance
8. Basic logic Gates using discrete components
9. Thermo-emf by direct deflection method
10. Characteristics of Zener diode

**A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai.**

III-B.Sc., Physics Semester-V

Title of the Paper: CC IX- OPTICS AND SPECTROSCOPY

(For candidates admitted from 2018 onwards)

Subject Code: 18 PH 509

No. of Hours: 5

No. of Credits: 5

Learning Objectives:

- ❖ The students will understand the concept of *optical concepts like interference, diffraction and polarization.*
- ❖ *To highlight the various applications of geometric optics and some idea about resolving power.*
- ❖ *To facilitate, introduce and make the students understand the basic concept to spectra.*

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible citizens.

PSO2: To understand the concepts and significance of the various physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course outcome

Having successfully completed the course, the student will be able to

CO1: Understand the properties of light like reflection, refraction, interference, diffraction etc.

CO2: Gain knowledge on various theories of light.

CO3: Acquire skills to identify and apply formulas of optics and wave physics.

CO4: Understand the applications of diffraction and polarization.

CO5: Understand the concept of IR spectroscopy, Raman Spectroscopy and UV spectroscopy of molecules.

Unit I: Geometrical optics

Aberrations – Spherical aberration – Methods of reducing spherical aberration – Coma – Astigmatism – Curvature of the field – Distortion - Chromatic aberrations - Chromatic aberrations in a lens – Achromatic lenses - Ramsden’s eyepiece – Huygen’s eyepiece – comparisons of eyepieces - Primary and Secondary rainbow.

Unit II: Interference

Interference – condition for interference – Colours of thin films - Air wedge: Theory and experiment – Newton’s rings: Theory & experiment – Michelson Interferometer – Fabry-Perot Interferometer – Interference filter – Holography – Construction and reconstruction of a hologram – Applications.

Unit III: Diffraction and Resolving power of optical instruments

Fresnel’s diffraction – Diffraction at a circular aperture, Straight edge –Zone plate – Fraunhofer diffraction at a single slit – Double slit – Plane transmission diffraction

grating – Dispersive power of a grating - Oblique incidence – Grating at Normal incidence method - Resolving power – Resolving power of a Telescope and microscope.

Unit IV: Polarization

Introduction - Nicol prism – Nicol prism as a polarizer and analyzer – Elliptically and circularly polarized light – Production and detection – Quarter wave and half wave plate - Optical activity – Fresnel's explanation of optical activity – Laurent's Half shade polarimeter – Optical rotation by magnetic and electric fields.

Unit V: Spectroscopy

Types of spectra – Infrared spectroscopy: Techniques and instrumentation - Ultraviolet Spectroscopy: techniques and instrumentation – Rayleigh's scattering - Raman Effect: Experimental verification – Quantum theory of Raman Effect – applications – NMR: Theory and experiment.

Books for Study:

1. Murugesan, R. and Kiruthiga Sivaprasth S. 2008, Optics and Spectroscopy 9th Edition, Chand & Co. Ltd., S. Chand & Company ltd, New Delhi.
2. Brijlal Subramanyam, N and Avadhanulu, M.N. 2014, A Text book of Optics 9th Revised Edition, S. Chand & Co. Ltd., S. Chand & Company ltd, New Delhi.

Books for Reference

1. Francis, A. Jenkins and Harvey E. White, 2011, Fundamentals of Optics – Fourth edition, McGraw Hill Inc, New Delhi.
2. Ajoy Ghatak, 2009, Optics, Fourth edition, Tata McGraw-Hill publishing Co. Ltd., New Delhi.
3. Khanna, D. R and Gulati H R, 1979, Optics, First edition, R Chand & Co. Pvt. Ltd., New Delhi.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks) **(Answer ALL questions)**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks) **(Answer the following questions)**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks) **(A subdivision in ANY ONE question should be a problem)** **Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-V

Title of the Paper: CC X- MATERIALS SCIENCE

(For candidates admitted from 2018 onwards)

Subject Code: 18 PH 510

No. of Hours: 04

No. of Credits: 04

Learning Objectives:

To develop knowledge in materials science and to understand the relationship between structure, properties and material characteristics.

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible Citizens.

PSO2: To understand the concepts and significance of the various Physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course outcome: After the completion of this course, the student will be able to:

CO1: Understand the conducting, crystalline, magnetic and dielectric behavior of materials.

CO2: Differentiate between diamagnetic, paramagnetic, ferromagnetic, ferromagnetic, and antiferromagnetic behavior of materials.

CO3: Synthesis and processing of Nano materials for engineering applications

CO4: Know the structure and properties of different crystalline materials.

CO5: Know the properties and applications of Bio materials and NDT.

UNIT – I: Conducting Materials

Introduction to bonds: Ionic bond – Bond dissociation energy – Cohesive energy – Covalent bond–Metallic bond– Vander Waals bond– Hydrogen bond – Free Electron Theory – Expression for electrical conductivity and Thermal conductivity – Wiedemann-Franz law – Lorentz Number.

UNIT – II: Crystalline Materials

Basis and crystal structure –Unit cell – Bravais lattice – Miller indices – Types of crystal system – Simple Cubic, Body Centered Cubic, Face Centered Cubic structure, HCP structure – Crystal imperfections: Point defects – Line defects – Surface defects – Volume defects.

UNIT – III: Magnetic Materials

Magnetism: Basic definitions – Types of magnetic materials – Dia, Para and Ferro magnetism – Weiss's theory of Paramagnetism – Domain theory of ferromagnetism – Antiferromagnetic materials – Ferrites and its applications.

UNIT – IV: Dielectric Materials

Dielectric materials – Fundamental definitions in dielectrics – Different types of polarization – Frequency and temperature effects on polarization – Dielectric loss – Dielectric breakdown – Local field or internal field – Clausius Mosotti relation – Applications of dielectric materials.

UNIT – V: Advanced Engineering Materials

Metallic glasses – Shape Memory Alloys – Bio materials – Properties – preparation and Applications – Non Destructive testing (NDT) – NDT testing Method – Pulse echo method – Transmission method – Ultrasonic flaw detector.

Books for Study:

1. Arumugam, M. 2010. Material Science, Fifth Edition, Anuradha publishers.
2. Arumugam, M. 2015. Engineering Physics, Second Edition, Anuradha publishers.
3. Muthukumar, S. Balaji, G and Masilamani, S, 2016. Engineering Physics –I, Ninth Edition, Sri Krishna Hitech Publication Company Pvt.Ltd, Tamil Nadu, India.

Books for Reference:

1. Rajendran, V and Marikani, A. 2012. Material Science, First Edition, Tata Mcgraw Hill Publisher, New Delhi.
2. Pillai, S.O. 2009. Solid State Physics, Eighth Edition, New Age International (P) Ltd., publishers, India.
3. Raghavan, V. 2007. Material Science and Engineering, Fifth Edition, Prentice Hall of India (PHI) Learning Publishers, India.

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks : 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**(A subdivision in ANY ONE question should be a problem)****Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-V

Title of the Paper: CC XI -SEMICONDUCTOR DEVICES

(For candidates admitted from 2018 onwards)

Subject Code: 18 PH 511

No. of Hours: 4

No. of Credits: 4

Learning Objectives:

- To enable the students to understand all aspects of electronics in a lucid and comprehensive manner.
- To understand various techniques and concepts in electronics.
- To learn about the working diodes.
- The students will understand operation of semiconductor devices.

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible Citizens

PSO2: To understand the concepts and significance of the various Physical phenomena

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course Outcome:

Having successfully completed the course, the student will be able

CO1: To characterize semiconductors, diodes, transistors & FET and also to study different biasing techniques to operate transistor

CO2: To know the application of transistors as amplifiers and oscillators

CO3: To understand the characteristics of thyristors and their applications. Also to know the basics of integrated circuits

CO4: To study the basics of special purpose diodes & opto electronic devices and their applications in different areas.

CO5: To know the fundamentals of Operational amplifiers and its applications.

UNIT I Bipolar Transistors & Special Semiconductors

Bipolar junction transistor – Basic configurations – Relation between α and β – Characteristic curves of transistor – CB, CE mode – DC load line – DC bias and stabilization – fixed bias – voltage divider bias – JFET-Working and characteristics – MOSFET: Depletion and Enhancement type MOSFET – Working and characteristics.

UNIT II Amplifiers and Oscillators

Introduction to h parameters – Single stage CE amplifier – Power amplifiers – Efficiency of class A, B & C Power amplifier – General theory of feedback – Properties of negative feedback – Low Frequency common source and common drain FET amplifiers – Criterion for oscillations – Hartley oscillator – Colpitt's oscillator.

UNIT III Thyristors & IC's

Construction, working and V-I characteristics of SCR, UJT, DIAC & TRIAC – SCR as a switch – UJT relaxation oscillator – Basic monolithic ICs – Epitaxial growth – Masking – Etching- Impurity diffusion – Fabricating monolithic resistors, diodes and transistors.

UNIT IV Special purpose diodes and Opto-electronic devices

Tunnel diode – Schottky diode – PIN diode – LED – Photo diode – LASER diode – Gunn diode – Functions, characteristics and applications.

UNIT V Operational amplifier

Operational amplifier – Characteristics of ideal op-amp – Inverting and Non-inverting amplifier – Voltage follower – Adder, Subtractor, Integrator and Differentiator circuits – A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.

Books for study:

1. Mehta V.K., 2014, *Principles of Electronics*, S. Chand and company Ltd,.
2. Dr. R. Sedha, 2010, *Text Book of Applied Electronics*, S Chand–New delhi.
3. Theraja. B.L, 2002, *Basic electronics - Solid State*, S.Chand and Company Ltd.

Books for Reference:

1. G.K. Mithal, *Basic electronic devices and circuits*, Khanna Publishers.
2. B. Basavaraj and H.N. Shivasankar, 2018, *Basic electronics*, University Press.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

(A subdivision in ANY ONE question should be a problem)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

**A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai**

III-B.Sc., Physics Semester-V

Title of the Paper: CC XII- MAJOR PRACTICAL - V

(For candidates admitted from 2018 onwards)

No. of Hours: 6

No. of Credits: 6

Subject Code: 18 PHP 512

Objectives:

- ❖ *To understand the concepts and techniques in physics experiments and develop instrument handling skills.*
- ❖ *To develop circuit building skills and trouble shooting ability in electronic experiments.*

List of Experiments

(Any TWELVE experiments)

1. Spectrometer - (i-d) curve .
2. Spectrometer - (i-i') curve.
3. Spectrometer - Dispersive power of a prism.
4. Potentiometer – High range voltmeter
5. Ballistic Galvanometer - Figure of Merit.
6. Ballistic Galvanometer- Absolute capacity of a condenser.
7. Carey Foster Bridge - Temperature co-efficient of resistance of the material of a coil.
8. Voltage Doubler and Tripler.
9. Clipping and clamping circuits - Study by CRO
10. Emitter Follower – Frequency response.
11. Single Stage CE Transistor Amplifier – Frequency response.
12. FET characteristics.
13. Basic Logic Gates using discrete components.
14. NAND and NOR gates using RTL logic.
15. Hartley Oscillator using Transistor – Study by CRO & Beats method
16. Solving Quadratic Equation – using C Programming.
17. Find Hartmann's constant using C programming
18. Conversion of Fahrenheit to Celsius and Celsius to Fahrenheit scale of Temperature using C Programming.
19. Arranging a set of numbers in Ascending order using C Programming
20. Arranging a set of numbers in Descending order using C Programming

A.V.C. College (Autonomous)
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Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-V

Title of the Paper: EC I - COMPUTER PROGRAMMING in "C"

(For candidates admitted from 2018 onwards)

Subject Code: 18 PHE 501

No. of Hours: 5

No. of Credits: 5

Learning Objectives:

- This course is an essential one designed
- ❖ To have an insight in to the basic computer concepts of Programming
 - ❖ To acquire knowledge on basic concepts of C Programming
 - ❖ To acquire knowledge on looping statements
 - ❖ To acquire knowledge on arrays
 - ❖ To perform fundamental exercises in computer programming

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible Citizens.

PSO2: To understand the concepts and significance of the various Physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course Outcome:

Having successfully completed the course,

CO1: The student will be able to Read, understand and basic structure of C language

CO2: Able to define data types and use them in simple data processing application

CO3: Students must be able to use the concept of array of structures.

CO4: Student must be able to define union and enumeration user defined data types

CO5: To be able to develop C programs

UNIT – I – Constants, Data types and Operators

Importance of C – Basic structure of C program – Constants – Variables – Character set – Keywords and Identifiers - Data types – Declaration of variables – Assigning values to variables- Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrements, Conditional, Bitwise, Comma Operators – Arithmetic expressions – Associativity.

UNIT – II – Decision making Branching and Looping

getchar and putchar statements – formatted input (scanf) and formatted output (printf) statements – Simple if statement – if ... else statement – Nesting of if ... else statement – if ... else ladder – Switch statement – The break and continue statements – goto statement – while statement – do ... while statement – for statement – Nesting of for statement – Jump in loops.

UNIT – III – Array and Structure

Introduction – One dimensional array – Two dimensional array – Declaring arrays – Storing arrays in memory – Initializing arrays- Structure definition – Structure initialization – Arrays within structure – Structure within structure – Structures and functions – Union.

UNIT – IV – Functions

Introduction to function – Need for function – Return values and their types – Calling a function – Category of function – No argument and no return values – Arguments but no return values – Arguments with return values – Nesting of functions – Recursion – Function within arrays.

UNIT – V – File Management and Programs

Files – definition – Opening and closing of files – Input/output operations on files – Elementary ideas of Pointers.

Developing programs with flowchart and algorithm for the following:

- 1) Average of set of numbers.
- 2) Finding the Largest and Smallest number of given set of numbers.
- 3) Solving Quadratic equation.
- 4) Conversion of Fahrenheit to Celsius and Celsius to Fahrenheit.
- 5) Write a program Hartmann's formula using prism spectrometer.
- 6) Write a program for matrix addition.
- 7) Write a program for matrix subtraction.

Book for Study:

1. Balagurusamy E., 2019, Programming in 'C', 8th Edition, Tata McGraw-Hill Publishing.

Book for Reference:

1. Ravichandran D.,1996, Programming in 'C',New Age International Publishers.
2. Rajaraman V.,1994 , Computer programming in 'C', PHI Learning.
3. Ram Kumar and Rakesh Agarwal,1991, Computer programming in 'C',1st Edition,Thomson Learning.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. College (Autonomous)
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III-B.Sc., Chemistry Semester-V

Title of the Paper: NMEC-I- Non- Conventional Energy Resources

(For candidates admitted from 2018 onwards)

Subject Code: 18 NMPH 501

No. of Hours: 2

No. of Credits: 2

Learning Objectives: To enable the student to aware about renewable energy and types.

Course Outcome:

CO1: To know the basic concept of energy resources

CO2: To understand the principle solar cell and its uses

CO3: To study about introduction of Geothermal energy and wind energy

CO4: To understand the Biomass energy and Tidal energy

CO5: To learn the principle of Fuel cells and its various applications

Unit-I: Types of Energy sources

Conventional Energy sources, India's production and reserves of commercial energy sources - Need for Non-conventional energy sources-Types of Non-Conventional energy sources- energy alternatives.

Unit-II: Solar Energy

Solar cell – Photovoltaic effect – Performance of solar cell – Performance limitations – Angstrom's Pyroheliometer – Box Type Solar cooker – Solar Cooling – Solar Air heater –Applications – Advantages and Disadvantages.

Unit-III: Geothermal Energy and Wind Energy

Geothermal energy – Geothermal sources – Uses of Geothermal energy – Hydrothermal convective system – Wet-Stream System and Hot Water System – Wind energy – Types of Wind Power Plant – HAWT and VAWT – Advantages and Disadvantages.

Unit-IV: Biomass Energy and Tidal Energy

Biomass – Photosynthesis –Bio gas– Biomass conversion – Thermochemical Conversion – Biogas plants – Floating Drum Type Biogas Plant (KVIC Model) – OTEC – Technology – Environmental effects – Tidal energy – Wave energy.

Unit-V: Fuel Cells

Introduction to fuel cell – Elements of fuel cell – Types of fuel cells – H₂-O₂ cell – Hydrogen energy – Applications– Advantages and Disadvantages.

Book for Study:

1. Rai, G.D. 2011, Non-conventional energy sources, Fifth Edition, Khanna Publishers.
2. Khan, B.H. 2012, Second Edition, Non-conventional energy sources, Tata McGraw Hill publication, India.

Book for Reference:

1. Chauhan, D.S and Srivastava, S.K. 2004, Non-conventional energy resources, Fifth Edition, New Age International Pvt Ltd Publishers.
2. Rai, G.D, 2007, Solar energy utilization, Forth Edition, Khanna Publishers.
3. Sukhatme, S.P. 2012, Solar energy, Second Edition, Tata McGraw Hill publication, India.
4. Kothari, D.P, Singal and Rakesh Ranjan, K.C, 2004, Renewable energy sources and emerging technologies , Second Edition, Prentice Hall of India Pvt. Ltd., New Delh.
5. Abbasi, S.A and Naseema-Abbasi, 2004, Fourth Edition, Renewable energy sources and their environmental impact – PHI Learning Pvt. Ltd., New Delhi.

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks: 75****Section – A (5 X 15 = 75 Marks)****Answer any FIVE Questions out of EIGHT questions
Without Omitting any Unit**

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-V

Title of the Paper: SBC II – Trouble Shooting and Repairing of Basic Lab Equipments
(PRACTICAL) *(For candidates admitted from 2018 onwards)*

Subject Code: 18 SPHP 502

No. of Hours: 2

No. of Credits: 2

Objectives

- ❖ To inculcate the skill of trouble shooting and repairing of laboratory equipments among the students and to enrich their confidence in handling the lab equipments.

List of Experiments

(Any FIVE experiments)

1. Construction and testing of regulated power supply (5 Volt)
2. Construction and testing of regulated power supply (12 Volt)
3. Construction and testing of regulated power supply (2, 4, 6 Volt)
4. Voltmeter calibration and testing
5. Ammeter calibration and testing
6. Testing of decade condenser box
7. Testing and service of decade resistance box
8. Construction and testing of dual power supply-(15-0-15 V)
9. Construction and testing of IC regulated power supply

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai
III-B.Sc., Physics Semester-VI

Title of the Paper: CCXIII-ATOMIC AND NUCLEAR PHYSICS

(For candidates admitted from 2018 onwards)

Subject Code: 18 PH 613

No. of Hours: 4

No. of Credits: 4

Objectives:

- This course will introduce students to the fundamentals of atomic and nuclear Physics.
- It aims to provide a coherent and concise coverage of traditional atomic and nuclear physics.
- The course will give knowledge about the structure of the atom.
- The course provides the students about the knowledge of x-rays, photo electricity and elementary particles.

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible Citizens.

PSO2: To understand the concepts and significance of the various Physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course outcomes:

After the completion of the course students will be able to

- CO1: Get the knowledge about Cathode rays and positive rays
- CO2: The information will teach the students about the structure of the atom
- CO3: Study the introduction to the nucleus
- CO4: Understand the concept of x-rays and photo electricity
- CO5: Have acquire knowledge and understanding about the nuclear energy and elementary particle

UNIT-I: Cathode rays and Positive Rays

Cathode rays- Production and properties-Positive rays-properties of positive rays-Determination of e/m of Positive rays (Thomson's Mass Spectrograph) – Bainbridge Mass Spectrograph-Applications of Mass Spectrography-Dempster's Mass Spectrograph-Critical potential-Methods of excitation-uses of Mass Spectrographs-Franck and Hertz's experiment.

UNIT-II: Structure of the atom

Bohr atom model-The vector atom model-Quantum numbers associated with vector atom model-coupling schemes-Applications of vector atom model-Pauli's exclusion principle-fine structure of spectral lines-The Stern-Gerlach experiment-Zeeman effect-Experimental arrangement-Paschen back effect-Stark effect (outline only).

UNIT-III: Introduction to the nucleus

Introduction-classification of nuclei-General properties of nucleus-size,mass,density, charge, spin angular momentum-Nuclear magnetic dipole moments-Electric quadrupole moment- Binding energy-Packing fraction-Nuclear stability-Nuclear forces-Meson theory of nuclear forces-The liquid drop model-The Shell model.

UNIT-IV: X-Rays and Photo-Electricity

Introduction-production of X-rays-Coolidge tube-Properties of X-rays-uses of X-rays-Bragg's law- Bragg's X-ray Spectrometer-wavelength and crystal structure-continuous X-rays-Determination of Planck's constant h- The Powder Crystal Method-The Laue Method- Rotating Crystal Method.

UNIT-V: Nuclear energy and elementary particles

Nuclear energy-Nuclear Fission-Bohr wheeler's theory of nuclear fission-Nuclear Reactors-Development of Atomic power in India-Nuclear fusion-Stellar energy-Carbon nitrogen cycle-Proton- Proton cycle.

Elementary particles-Classification-Particles, antiparticles and anti matter-Fundamental interactions-Quark model-Qualitative studies of Galaxies- Birth and death of stars-Black holes.

Books for study:

1. Brijlal&NSubrahmanyamN.2013.Atomic andnuclearphysics, S.CHAND&COMPANY LTD.
2. R.Murugesan,kiruthigasivaprasath,ModernPhysics,Eighteenth edition , S.CHAND&COMPANY LTD,
3. Hewish. A.1992.Physics of the universe,CSIR publication, New Delhi.
4. Biman Basu. 1992.Inside stars, CSIR publication, New Delhi.
5. Krishnaswamy K.S.2010.Astro physics A modern Perspective, Reprint 2003,New age international(P) Limited, New Delhi.

Books for reference:

1. J.B.Rajam-Modern Physics S.CHAND&COMPANY LTD
2. S.N.Ghosal , Reprint 2010 Atomic Physics,S.CHAND&COMPANY LTD

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks : 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- | | |
|------------------------|-----------------------|
| 1 & 2. From Unit – I | 3 & 4. From Unit – II |
| 5 & 6. From Unit – III | 7 & 8. From Unit – IV |
| 9 & 10. From Unit – V | |

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- | | | | |
|----------------|-------------------|----------------|------------------|
| 11. (a) or (b) | – From Unit – I | 12. (a) or (b) | – From Unit - II |
| 13. (a) or (b) | – From Unit – III | 14. (a) or (b) | – From Unit - IV |
| 15. (a) or (b) | – From Unit – V | | |

Section – C (3 X 10 = 30 Marks)

(A subdivision in ANY ONE question should be a problem)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-VI

Title of the Paper: CC XIV- THEORETICAL PHYSICS

(For candidates admitted from 2018 onwards)

Subject Code: 18 PH 614

No. of Hours: 4

No. of Credits: 4

Objective:

- To learn about the fundamentals of classical formalism.
- To learn about introduction to quantum mechanics.
- To know the facts and develop a unified and logical treatment of the subject matter with clarity and conciseness.

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible Citizens.

PSO2: To understand the concepts and significance of the various Physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Outcomes: Having successfully completed the course, the student will be able to

- CO1: Study the essential elements in the most important theories of physics, such as Mechanism of a particles, conservation theorems and symmetry properties.
- CO2: Study the behavior of angular momentum, liner momentum and energy of the particles.
- CO3: Understand the concept of De- Broglie matter waves, Phase velocity and Group velocity.
- CO4: Understand the concept of wave mechanics and wave equation.
- CO5: Understand the concept of radiation, Photoelectric effect, Compton Effect and photocell.

UNIT I: Fundamental Principles and Lagrangian Formulation

Mechanics of a particle and system of particles – Conservation laws – Constraints – Generalized coordinates – Principle of virtual work – D'Alembert's principle and Lagrange's equation – Hamilton's principle – Lagrange's equation of motion – conservation theorems and symmetry properties – Atwood's machine – Simple pendulum.

UNIT II: Hamilton's Formulation

Generalized momentum – Cyclic or Ignorable Co-ordinates – Lagrangian formulation of conservation theorems – Generalized momentum, energy, linear momentum and angular momentum – Hamiltonian function & its Physical Significance – Hamilton's equations – Simple pendulum – Compound Pendulum.

UNIT III: Dual Nature of Matter

De-Broglie concept of matter waves – De-Broglie wavelength – phase velocity and group velocity – Experimental study of matter waves – Davison and Germer experiment – G.P. Thomson’s experiment – Neutron Diffraction (Qualitative Discussion) – Electron microscope – Gamma ray microscope.

UNIT IV: Basics of Quantum Mechanics I

Basic postulates of Quantum Mechanics – Development of Schrödinger wave equation using Operators – Time independent and dependent – Physical Significance of wave functions – Orthogonal function, normalized function and Kronecker delta function – Particle in a box – Barrier Penetration – Linear harmonic oscillator.

UNIT V: Basics of Quantum Mechanics II

Distribution of energy in black body Spectrum – Plank’s black body radiation law – Photoelectric effect – Laws of Photoelectric effect – Einstein’s Photoelectric equation – Determination of Planck’s constant – Photocells - types and applications – Moseley’s Law and its importance – Compton effect – Theory – Experiment.

Books for study:

1. R. Murugesan, 2015, *Mechanics and Mathematical Methods*, 3rd edition S. Chand & Co., New Delhi.
2. R. Murugesan and Kiruthiga Sivaprasath, 2006, *Modern Physics*, S. Chand & Co., New Delhi.
3. Brijlal and Subramaniam, 2013 *Atomic and Nuclear Physics*, 2nd edition, S. Chand & Co. New Delhi.
4. S.L.Gupta., V. Kumar and H.V. Sharma, 2011 *Classical Mechanics* 25th edition Pragathi Prakasan, Educational Publisher, Meerut, ,.
5. Murugesan, R., 2006 *Modern Physics*, S. Chand & Co., New Delhi,

Books for Reference:

1. Arthur Beiser, *Concept of Modern Physics* V 1999 McGraw Hill Ed.
2. H. Goldstein, *Classical Mechanics*, Narosa Book distributors, New Delhi.
3. N.C. Rana and P.S. Joag, *Classical Mechanics*, Tata Mc Graw Hill, New Delhi 1991.
4. P.M. Mathews and K. Venkatesan, *A Text Book of Quantum Mechanics*, Tata McGrawHill, New Delhi.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

(Answer ALL questions)

- | | |
|------------------------|-----------------------|
| 1 & 2. From Unit – I | 3 & 4. From Unit – II |
| 5 & 6. From Unit – III | 7 & 8. From Unit – IV |
| 9 & 10. From Unit – V | |

Section – B (5 X 5 = 25 Marks)

(Answer ALL questions)

- | | |
|----------------------------------|---------------------------------|
| 11. (a) or (b) – From Unit – I | 12. (a) or (b) – From Unit – II |
| 13. (a) or (b) – From Unit – III | 14. (a) or (b) – From Unit – IV |
| 15. (a) or (b) – From Unit – V | |

Section – C (3 X 10 = 30 Marks) (Answer any THREE questions)

(A subdivision in ANY ONE question should be a problem)

- | | |
|---------------------|--------------------|
| 16. From Unit – I | 17. From Unit – II |
| 18. From Unit – III | 19. From Unit – IV |
| 20. From Unit – V | |

A.V.C. College (Autonomous)
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Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-VI

Title of the Paper: DIGITAL ELECTRONICS AND MICROPROCESSOR

(For candidates admitted from 2018 onwards)

Subject Code: 18PH 615

No. of Hours: 4

No. of Credits: 4

Course Objective:

- ❖ To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- ❖ To introduce students with the architecture and operation of typical microprocessor.

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible Citizens.

PSO2: To understand the concepts and significance of the various Physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course Outcomes:

At the end of the course, a student will be able to:

- CO1: Apply Boolean laws to simplify the digital circuits.
- CO2: Design various combinational circuits using logic gates.
- CO3: Do the analysis and design procedures for synchronous and asynchronous sequential circuits.
- CO4: Explain the microprocessor's internal architecture and its operation within the area of manufacturing and performance.
- CO5: Apply knowledge to develop assembly language program.

UNIT – I: DIGITAL FUNDAMENTALS

Basic and derived logic gates – Universality of NAND and NOR gates – Boolean algebra – De-Morgan's theorems – Reducing Boolean expressions using Boolean laws – SOP and POS forms of expressions- minterms and maxterms – Karnaugh's map simplification (upto four variables).

UNIT – II: COMBINATIONAL CIRCUIT DESGN

Half and full adders – Binary adders – Half and full subtractors – Binary subtractor – Two's complement adder / subtractor circuits – Decoder – Encoder – Multiplexer – Demultiplexer.

UNIT – III: SEQUENTIAL CRCUITS

Flip flops – RS – clocked RS – T and D flip flops – JK and Master Slave flip flops – Shift registers – shift left and right registers - Counters – Four bit asynchronous ripple counter – Mod-10 counter – Ring counter – Synchronous counter.

UNIT – IV: INTEL 8085 MICROPROCESSOR

Microprocessor – Architecture of 8085 – pin configuration - ALU – Timing and Control unit – Registers – System bus – Timing Diagram – Timing diagram for Opcode Fetch Cycle – Memory read – I/O Read – Memory Write – I/O Write.

UNIT – V: PROGRAMMING THE 8085 MICROPROCESSOR

Addressing modes of 8085 – Intel 8085 Instructions – Data transfer group – Arithmetic group – Logical group – Branch group – Stack, I/O and machine control group – Basic programs.

- 1) Addition of two 8-Bit numbers.
- 2) Subtraction of two 8-Bit numbers.
- 3) 8-bit Multiplication.
- 4) 8-bit division.

Books for study:

1. Albert Paul Malvino ,2017, Digital Computer Electronics,3rd edition,McGraw-Hill.
2. R.P. Jain and M.M.S. Anand, 2001,Digital Electronics Practice Using Integrated Circuits,fourth edition,Tata McGraw-Hill Education.
3. B.L. Theraja, 2006,Basic Electronics ,Multi Colour Edition, S. Chand & Company.
4. V.K. Mehta and Rohit Mehta, 2006, Multi Colour Edition ,Principles of Electronics, S Chand,Edn.
5. B. Ram, 2005, Fundamentals of Microprocessors and Microcomputers,seventh edition, Dhanpat Rai Publications.

Books for reference:

1. Albert Paul Malvino and Donald P. Leach, 2011, Digital Principles and Applications,seventh edition,McGraw-Hill.
2. K. Meena,2009, Principles of Digital electronics,second edition,PHI Learning Pvt. Ltd.
3. Gaonkar, 2000, Microprocessor Architecture, Programming, and Applications with the 8085/8080A,fourth edition,C.E. Merrill **Publishing** Company,.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks : 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

(A subdivision in ANY ONE question should be a problem)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-VI

Title of the Paper: CCXVI - MAJOR PRACTICAL – VI
(For candidates admitted from 2018 onwards)

Subject Code: 18 PHP 616

No. of Hours: 6
No. of Credits: 5

Objectives:

- ❖ *To understand the concepts and techniques in physics experiments and develop instrument handling skills.*
- ❖ *To develop circuit building skills and trouble shooting ability in electronic experiments.*

List of Experiments
(Any TWELVE experiments)

1. Spectrometer – Small angled prism – Determination of μ
2. Spectrometer – Mercury spectrum – Determination of wavelengths using grating – Minimum deviation method.
3. Spectrometer – Mercury spectrum – Determination of wavelengths using grating – Normal incidence method.
4. Spectrometer – Dispersive power of grating
5. Potentiometer – Comparison of EMFs
6. Potentiometer – EMF of a thermocouple.
7. B.G – Determination of 'M'
8. B.G – High resistance by Leakage
9. B.G - Comparison of EMFs
10. Demorgan's theorem – Basic logic gates – using IC's.
11. Universal Gates – NAND and NOR.
12. Half and Full Adder using Logic gates.
13. R-S Flip Flop using NAND and NOR gates.
14. Colpitt's oscillator using transistor - Study by CRO & Beats method
15. Astable Multivibrator Using Transistors.
16. Operational Amplifier – Adder and Subtractor.
17. Operational Amplifier – 3-bit – D/A converter - (Weighted Resistor network)
18. Microprocessor – Addition and Subtraction
19. Microprocessor – Multiplication
20. Microprocessor – Division

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PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-VI

Title of the Paper: EC III - Advanced Physics
(For candidates admitted from 2018 onwards)

No. of Hours: 4
No. of Credits: 4

Subject Code: 18 PHE 603

OBJECTIVES

- ❖ To gain knowledge on the importance of LASER physics
- ❖ To acquire knowledge about fiber optics and ultrasonic and their applications
- ❖ To promote the importance of super conductivity materials

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible citizens.

PSO2: To understand the concepts and significance of the various physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course outcomes

Having successfully completed the course, the student will be able to

CO 1: To understand the concepts of superconductors

CO 2: To understand the concepts of ultrasonics and its applications.

CO 3: Illustrate the working various type of lasers and Brief out the various concepts of advanced laser systems.

CO 4: Gain knowledge in optical fiber and their applications in communication.

CO 5: To know the importance of Non destructive testing

UNIT -I: SUPERCONDUCTIVITY

Superconductivity – Meissner effect – London equation –Elements of BCS theory – Classification of Superconductivity: Type-I and Type-II superconductors –High T_c superconductors-Applications of superconductor.

UNIT – II: ULTRASONICS

Introduction - Ultrasonic production: Piezoelectric effect – piezoelectric materials – piezoelectric oscillator - properties – Acoustic grating formation – application of ultrasonic waves: Ultrasonic flaw detector – Medical applications of ultrasonic waves.

UNIT - III: LASER PHYSICS

Basic Principle of Laser – Einstein coefficients - Population Inversion – Active medium-Active centre-Metastable state – pumping mechanisms - Optical Resonators - Types of lasers: Construction and working of Ruby laser, He-Ne laser, CO₂ lasers and Semiconductor lasers - Applications of laser.

UNIT – IV: FIBRE OPTICS

Introduction – Optical Fibre – Light propagation in fibers - Acceptance angle - Numerical aperture – Coherent bundle – Fibre optic communication system – Advantages - classification of fibers: step index and graded index fibers - single mode and multi mode fibers – Fibre optic sensors.

UNIT V: NON-DESTRUCTIVE TESTING (NDT)

Liquid Penetration Testing - Physical Principle - Magnetic Particle Testing (MPT) - Principle of MPT - Sensitivity - Limitation - Eddy Current Testing (ECT) - Principle - Instrument for ECT - Applications – Limitations – Radiographic testing – principle and technique.

Books for study:

1. Pillai S.O., Solid State Physics, 6th Edition, New Age Science, 2013.
2. Charles Kittel, Introduction to Solid State Physics, Wiley, 2005.
3. P. K. Palanisamy-Engineering Physics I, 2004, Scitech publications. Science and technology of Ultrasonics by Bladdevraj, Narosa.
4. M. N. Avadhanulu - An Introduction to laser: Theory and Applications, 2001, S. Chand and Co., New Delhi.
5. R. Murugesan and Kiruthiga Sivaprasth- Optics and Spectroscopy 2001, S. Chand & Co. Ltd., New Delhi.
6. Baldevraj, T. Jayakumar, M. Thanvasimuthu- Practical Non-Destructive Testing, 2002, Narosa Publishing House, Chennai.

Books for reference:

1. K. Thyagarajan and Ajoy Ghatak,- Laser theory and applications, 1999, Cambridge University Press,.
2. John M.- Senior Optical Fiber communications, 1996, Cambridge University Press.
3. A.V.K. Suryanarayana-Testing of Metallic Materials, 2003, B.S. Publications, Giriraj lane, Sultan Bazar, Hyderabad - 95.
4. Govind P. Agrawal - Fiber-Optic communication systems, 2003, John-Wiley & Sons.

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- | | |
|------------------------|-----------------------|
| 1 & 2. From Unit – I | 3 & 4. From Unit – II |
| 5 & 6. From Unit – III | 7 & 8. From Unit – IV |
| 9 & 10. From Unit – V | |

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- | | | | |
|----------------|-------------------|----------------|------------------|
| 11. (a) or (b) | – From Unit – I | 12. (a) or (b) | – From Unit – II |
| 13. (a) or (b) | – From Unit – III | 14. (a) or (b) | – From Unit – IV |
| 15. (a) or (b) | – From Unit – V | | |

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

- | | |
|---------------------|--------------------|
| 16. From Unit – I | 17. From Unit – II |
| 18. From Unit – III | 19. From Unit – IV |
| 20. From Unit – V | |

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Physics Semester-VI

Title of the Paper: EC II- NANO PHYSICS

(For candidates admitted from 2018 onwards)

Subject Code: 18 PHE 602

No. of Hours: 4

No. of Credits: 4

Learning Objectives:

To understand the history, background and the nature of the nano science and technology as well as the quantum and nano sized scale effects at nano phase.

To get familiar with the nano characterization methods and to understand the potential applications of nanotechnology.

Programme Specific Outcomes:

On successful completion of B.Sc. Physics Programme, the students are able

PSO1: To enhance the academic abilities, employment opportunities and transferable skills which will make them to develop as responsible citizens.

PSO2: To understand the concepts and significance of the various physical phenomena.

PSO3: To ensure higher learning in Physics at reputed Institutes that provides wider research opportunities.

PSO4: To apply the theories learnt and the skills acquired to solve real time problems and to acquire a wide range of problem solving skills, both analytical and computational.

Course outcomes:

After the completion of this course, the student will be able to:

CO1: Understand the properties of nano materials.

CO2: Gain knowledge about the synthesis of nano materials

CO3: Know the various characterization methods in nano physics.

CO4: Understand the properties and applications of nano materials.

CO5: Know the properties and applications of Nanomaterials and Nanocomposites.

UNIT-I: FUNDAMENTALS OF NANOSCIENCE

Importance of Nanotechnology-History of Nanotechnology – nanostructures in nature - nano scale-length and time scale in structures - Introduction to 'Top down' and 'Bottom up' method - Properties of nanomaterials - mechanical,optical and electrical only - introduction to quantum confinement - surface effects of nanomaterials.

UNIT-II: CLASSIFICATION OF NANOPARTICLES AND ITS PROPERTIES

Metal Nanoparticles: Structural, Surface, electronic properties.

Semiconductor Nanoparticles: Semiconductor quantum dots (SQDs), Quantum Wires

Semiconductor Nanocomposites: Types of Nanocomposites (Metal oxides, ceramic and Glass), properties of nanocomposites.

Carbon Nanostructures: Introduction, Fullerenes, C60, CNT .

UNIT-III: SYNTHESIS OF NANOMATERIALS

Physical methods: Spray pyrolysis, Physical vapour deposition (PVD), Microwave heating,

Chemical methods: Chemical and co - precipitation, Sol fundamentals - sol - gel

UNIT-IV: CHARACTERIZATION TECHNIQUES

Principles and Working of - Powder X - Ray Diffraction, Scanning electron microscope (SEM), Transmission electron microscope (TEM), Atomic force microscope (AFM) – UV visible spectroscopy.

UNIT-V: APPLICATIONS OF NANOMATERIALS AND NANOCOMPOSITES

Nanosensors: Sensors based on physical properties - Electrochemical sensors, defence and Biosensors.

Energy: Solar cells and Photovoltaic device applications.

Photocatalytic applications: Air purification, Water purifications and pollution degradation.

Carbon nanotubes: Fuel cells and Display devices.

Books for study:

1. Shanmugam, S. 2011, Nano technology, First Edition, MJP Publishers.
2. Anandha Krishna Rao, 2010, First Edition, Nanotechnology (Tools & Techniques), Adzihyayan Books Publishers.
3. Shah M.A. & Tokeer Ahmad , Principles of Nanoscience & nanotechnology Narosa Publishing House.
4. Ravichandran K, Swaminathan K, Sakthivel B Introduction to Thin Films by Research India Publication, New Delhi
5. Ravichandran K, Swaminathan K, Sakthivel B, Ravidhas C, 2016 Introduction to the Characterizations of nano materials and Thin films By - Jazam Publication, Tiruchirappalli, .
6. Ravichandran K, Swaminathan K, Sakthivel B 2017 Introduction to Thin Films , Research India Publication, New Delhi .

Books for reference:

1. Nanotechnology – Mick Wilson, Kamali Kannangara, Geoff Smith & others, Overseas Press.
2. Nano: The essentials – T. Pradeep, Tata McGraw Hill Pvt.
3. NPTEL Lecture Series

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- | | |
|------------------------|-----------------------|
| 1 & 2. From Unit – I | 3 & 4. From Unit – II |
| 5 & 6. From Unit – III | 7 & 8. From Unit – IV |
| 9 & 10. From Unit – V | |

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- | | |
|----------------------------------|---------------------------------|
| 11. (a) or (b) – From Unit – I | 12. (a) or (b) – From Unit – II |
| 13. (a) or (b) – From Unit – III | 14. (a) or (b) – From Unit – IV |
| 15. (a) or (b) – From Unit – V | |

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

(A subdivision in ANY ONE question should be a problem)

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. College (Autonomous)
PG & Research Department of Physics
Mannampandal-609 305, Mayiladuthurai

III-B.Sc., Chemistry Semester-VI

Title of the Paper: NMEC II- PHYSICS IN EVERYDAY LIFE

(For candidates admitted from 2018 onwards)

No. of Hours: 2

No. of Credits: 2

Subject Code: 18 NMPH 602

Objectives:

- ❖ This course is an essential one designed to understand the concept of electric train and information about television, current, the working of household things, concept of optics in day to day life, scientific things behind nature.

Course Outcomes

Having successfully completed the course, the student will be able to

- **CO1** : Understand the concept of electric train and information about television
- **CO2** : Understand the concept of current
- **CO3** : Understand the working of household things
- **CO4** : Understand the concept of optics in day to day life
- **CO5** : Understand the scientific things behind nature

UNIT – I

Working of an electric train - Working of train brake - Working of Remote control in TV - Signal reception in antenna - Working of Touch Screen - Storing of information in a digital video disc.

UNIT – II

Consumption of more Current during low voltage - Cause of death due to electric current - Power generation from gas fired station - Global positioning system(GPS)- Superconductivity - Consumption of low electricity by CFL.

UNIT – III

Working of Thermostat - Working of Pressure Cooker - Working of Microwave Oven - Working of Automatic Wrist Watch - Curve nature of fan Wing- Cleaning of clothes in dry cleaning

UNIT – IV

Sparkles diamond more than a glass - Working of lightning arrestor - Difference between optical fibres and ordinary cables - Usage of Sodium vapour lamp in streets - Reason for not affecting aeroplanes by lightning - Reason for not travelling sound in vacuum.

UNIT – V

Formation of mushroom cloud after a nuclear bomb explosion - Measurement of severity of earthquakes in Richter scale - Satellites always launched from east Coast - Significance of Sriharikota as place for launching rockets - Reason for seeing one side of the moon always-Reason for not hearing sound during meditation.

Books for study and reference:

1. The Hindu Speaks on Scientific Facts-Volume I - 2002& Volume II -2004 II-The Hindu Publication Kasturi & Sons Ltd.(Unit-I,II,III,IV&V)
2. How things work? - Bright carriers institute,1525, Naisarak, Delhi-110006.

QUESTION PAPER PATTERN (From 2018 onwards)

Section- A (5 x 15 = 75)

**Answer any FIVE Questions out of EIGHT questions
Without Omitting any Unit**

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305**DEPARTMENT OF PHYSICS****Scheme for the M.Sc., Students****From 2018 – 2019 Onwards**

SEMESTER	COURSES	HOURS	CREDITS	TOTAL CREDITS
I	CC I – Classical and Relativistic Mechanics	6	5	22
	CC II – Mathematical Physics	6	5	
	CC III – Advanced Electronics	6	5	
	CC IV – Practical – I	8	3	
	Elective I – Advanced Optics	4	4	
II	CC V – Solid State Physics	6	5	20
	CC VI – Quantum Mechanics	6	5	
	CC VII – Microprocessor and Microcontroller	6	5	
	CC VIII – Practical – II	8	3	
	EDC I – Facts on everyday physics	4	2	
III	CC IX – Electromagnetic Theory	5	5	24
	CC X – Statistical Mechanics	5	5	
	CC XI – Atomic and Molecular Spectroscopy	4	5	
	CC XII – Practical – III	8	3	
	Elective II – Photonics and Nano Physics	4	4	
	EDC II – Functional Physics	4	2	
IV	CC XIII – Nuclear and Particle Physics	6	5	24
	CC XIV – Analytical methods in Physics	6	5	
	CC XV – Practical – IV	8	4	
	Elective III – Advanced Materials Science	4	4	
	Project	6	6	
	TOTAL			90

HOD of Physics

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 PPH 101

CLASS: I–M.Sc., PHYSICS

CREDITS: 5

HOURS: 6 / Week

Semester – I

CC I – CLASSICAL & RELATIVISTIC MECHANICS

(For candidates admitted from 2018 onwards)

UNIT – I: Lagrangian formulation

Mechanics of a system of particles – Conservation theorem for a system of particles – Constraints – Generalized coordinates – Transformation equations – Configuration space – Principle of virtual work – D'Alembert's principle – Derivation of Lagrange's equation from D'Alembert's principle – Lagrangian formulation of conservation systems – Rules for forming Lagrange's equation – Applications of Lagrange's equation: Simple pendulum, Compound pendulum and Atwood's machine.

UNIT – II: The Hamiltonian formulation and Variational Principles

Phase space – The Hamiltonian function H – Hamilton's equations – Physical significance of the Hamiltonian function – Applications of Hamiltonian equations: Simple pendulum – Compound pendulum – Hamilton's principle – Deduction of Hamilton's principle – One dimensional harmonic oscillator – Derivation of Lagrange's equation from Hamilton's principle – Modified Hamilton's principle – Variational principle – Principle of least action – Deduction of principle of least action.

UNIT – III: Two – Body problems and Hamilton – Jacobi methods

The Kepler's laws of planetary motion and their deduction – Virial theorem – Generation function and the canonical transformations – Conditions for transformation to be canonical – Poisson brackets – Properties of Poisson brackets – Canonical equations in terms of Poisson brackets – Lagrange brackets – Properties of Lagrange brackets – Relationship between the brackets – Hamilton–Jacobi equation – Action and angle variable.

UNIT – IV: Mechanics of a Rigid body and Oscillatory motion

Euler's angles – Moments and products of Inertia – Euler's equation of motion – Euler's geometrical equation – Motion of a Symmetrical top – Sleeping top – Oscillations about equilibrium – Theory of small oscillations – Normal modes and frequencies – Two-coupled harmonic oscillators – Linear tri-atomic molecule.

UNIT –V: Relativistic mechanics

Review of basic ideas of special theory of relativity – Minkowski's four dimensional space – Lorentz transformation as rotation in Minkowski's space – Four velocity – Four momentum – Relativistic Kinetic energy –Lagrangian formulation and Hamiltonian formulation of relativistic mechanics – Invariance of Maxwell's equations under Lorentz transformation – Elements of general theory of relativity.

Books for Study:

1. Gupta , Kumar , Sharma – Classical Mechanics, Pragathi Prakashan Meerut, (1985).
2. B.D. Gupta, Satya Prakash – Classical Mechanics, (Kedarnath Ramnath Meerut, (1975).
3. N.C. Rana and P.S. Joag – Classical Mechanics, Tata McGraw Hill, New Delhi (1991).

Books for Reference:

1. H. Goldstein – Classical Mechanics, Narosa Book Distributors, New Delhi (1980).
2. Gupta , Kumar , Sharma – Relativistic Mechanics, Pragathi Prakashan Meerut, (1985).
3. V.B. Bhatia, *Classical Mechanics* (Narosa, New Delhi, 1997).
4. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks : 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 PPH 103

CLASS: I-M.Sc., PHYSICS

CREDITS: 5

HOURS: 6 / Week

Semester – I

CC III – ADVANCED ELECTRONICS

(For candidates admitted from 2018 onwards)

UNIT – I: Semiconductor devices and Thyristors

Tunnel diode – Varactor diode – Schottky diode – PIN diode – LED – LCD – Photo diode – LASER diode – Gunn diode – Functions, characteristics and applications – MOSFET: Depletion and Enhancement type MOSFET – Working and characteristics – UJT characteristics – Relaxation oscillator – SCR characteristics – Application in power control – DIAC – TRIAC – SIDAC – IGBT.

UNIT – II: Operational Amplifier

Operational Amplifier – Ideal characteristics – Parameters – Inverting and non-inverting amplifier – Voltage follower – Summing amplifier – Subtractor – Integrator & differentiator – Log & antilog amplifiers – Voltage to current and current to voltage converter – Instrumentation amplifier – Active filters : low-pass, high-pass, band-pass – Solving simultaneous and differential equations.

UNIT – III: Applications of Operational Amplifier

Wien Bridge and phase shift oscillators – Triangular, Saw tooth and Square wave generators – Schmitt's trigger – Sample and hold circuit – Voltage Control Oscillator – Phase locked loops – D to A conversion: Weighted resistor DAC – Binary R-2R ladder DAC – A to D conversion: Counter type ADC – Successive approximation converter.

UNIT – IV: Digital Circuits I

Reduction of Boolean equations – SOP & POS expressions – Karnaugh map and simplifications (upto 4 variables) – Don't care conditions – RS Flip flop – Clocked RS Flip flop – JK Flip flop – Master Slave JK Flip flop – D Flip flop – Edge Triggered D Flip flop – T Flip flop – Flip flop switching time.

UNIT – V: Digital Circuits II

Serial in – Serial out, Serial in – Parallel out, Parallel in – Serial out and Parallel in – Parallel out shift registers – Ring Counter – Asynchronous Counter – Synchronous Counter – Mod 3 and 5 counters – Multiplexers (16 to 1 Multiplexer) – Demultiplexers (1 to 16 Demultiplexer) – Decoder (BCD to Decimal Decoder) – Decoder (Decimal to BCD Encoder).

Books for Study:

1. Digital Principles and applications, Albert Paul Malvino & Donald P, Leach, Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Text Book of Applied Electronics, Dr.R.. Sedha-S Chand-New delhi-2010.
3. Digital Electronics, Dr.R.. Sedha-S Chand-New delhi-2010.

Book for Reference:

1. Digital techniques – V.G. Yangalwar.
2. Electronics (classical and modern) KAR, Books and Allied (p) Ltd Kolkata–2007.
3. Operational amplifier and linear Integrated circuits, F.Conhlin & F.Driscols, Prentice–Hall of India–New Delhi–2001.
4. Op–amp and Linear Integrated circuits. R.A.Gaekwad, Prentice Hall, 1999.
5. Fundamentals of Digital Electronics, A.Anandakumar, PHI.
6. Transistor Physics – D.C. Sarkar.
7. Integrated Electronics – Botkar.
8. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks : 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 PPHE 101

CLASS: I-M.Sc., PHYSICS

CREDITS: 4

HOURS: 4 / Week

Semester – I

EC I – ADVANCED OPTICS

(For candidates admitted from 2018 onwards)

UNIT – I: FIBER OPTICS

Introduction – Construction of Optical fibers – Principle of optical fiber – Application and advantages of optic fiber – Acceptance angle – Numerical aperture and its expression – Types of Optical fibers – Single mode and multimode optical fibres – Characteristics of step index and graded index fibres – Fiber attenuation – Dispersion and its types – Fiber optic couplers and connectors – Fiber splices.

UNIT – II: LASERS

Introduction to Laser – Induced absorption – Spontaneous Emission – Stimulated emission – Principle of Laser and quantum cascade Laser – Conditions for obtaining laser – Einstein coefficients – Population inversion – Pumping – Properties of laser beam Schawlow and Townes condition-Laser Characteristics – Applications – Holography.

UNIT – III: SOLID STATE & GAS LASERS

Solid State Lasers: Ruby laser – U^{3+} in CaF_2 laser – Neodymium laser – Nd:YAG laser – Nd-Glass laser – Ho^{3+} :YLF laser.

Gas Lasers: He-Ne Laser – Copper vapour Laser – Ion Laser – Argon Ion Laser – (Krypton and Mercury vapour lamp Laser) – Metal vapour Laser – He-Cd Laser – He-Se Laser.

UNIT – IV: SEMICONDUCTOR, LIQUID, DYE AND CHEMICAL LASERS

Semiconductor Lasers: General features of semiconductor Lasers – Intrinsic semiconductor Lasers – Doped semiconductors – Injection Lasers – C^3 Laser.

Liquid, Dye and Chemical lasers: Liquid Lasers – Dye Lasers – Chemical Lasers – HCl Laser – HF Laser – DF-CO₂ Laser – CO chemical laser.

UNIT – V: NON-LINEAR OPTICS

Introduction-Harmonic Generation-Second Harmonic Generation- Phase matching-Third Harmonic Generation-Optical mixing: sum and difference frequencies-Parametric Generation of light-Self-focusing of intense light beams-Multi quantum photo electric effect-Two photon process and its theory.

Books for Study:

1. B.B. Laud – Lasers and Non-linear optics.
2. Neerajmehta – Applied physics for Engineers
3. M.N. Avadhanulu – Laser theory and application.

Books for Reference:

1. L.V. Tarasov – Laser physics
2. Kolchi Shimodo – Introduction to laser physics.
3. Gupta and others – Elements of spectroscopy, Atomic, Molecular and Laser physics.
4. A.K. Ghatak and K. Thiyagarajan – Laser theory and application.
5. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks: 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 PPHP 104

CLASS: I-M.Sc., PHYSICS

CREDITS: 3

HOURS: 8 / Week

Semester – I

CC IV – PRACTICAL – I

(For candidates admitted from 2018 onwards)

(Any **TWELVE** Experiments)

1. OP – AMP – Integrator, Differentiator and Scale changer
2. OP – AMP – Solving simultaneous equation
3. OP – AMP – D / A converter (Weighted, Non weighted, R – 2R Ladder network)
4. OP – AMP – Second order Filters (Low, High and Band pass)
5. OP – AMP – Wein bridge oscillator and attenuation characteristics of Wein's bridge
6. OP – AMP – Phase shift oscillator and attenuation characteristics of Phase shift network
7. OP – AMP – Monostable Multivibrator and frequency divider
8. FET – Amplifier (Single Stage) – Measurement of various parameters
9. SCR – Characteristics
10. DIAC and TRIAC – Characteristics
11. UJT – Characteristics and Relaxation oscillator
12. Shift register – IC 74194 & 74195
13. Half adder and Full adder using NAND and NOR gates only
14. Half subtractor and Full subtractor using NAND and NOR gates only
15. Flip –Flops – SR, D and JK using ICs
16. Power amplifier – Darlington pair amplifier
17. Monostable multivibrator using transistor
18. Two stage RC amplifier using Transistor
19. Schmitt Trigger using transistor.
20. 555 Timer – Monostable, Astable and Bistable

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE : 18 PPH 205

CLASS : I-M.Sc., PHYSICS

CREDITS:5

HOURS: 6 / Week

Semester - II

CC V - SOLID STATE PHYSICS

(For candidates admitted from 2018 onwards)

UNIT-I: Crystal structure

Introduction – Crystal translation vectors - Symmetry operation – Unit cell and primitive Lattice cell - Symmetry element - Point groups – space groups – Bravais lattice in two dimension - Three dimensional lattice type – Miller Indices– Reciprocal lattice – Atomic scattering factor.

UNIT-II: Bonding Nature

Types of bonding - Ionic bond – Energy of formation of NaCl molecule - Details of Madelung constant for sodium chloride lattice - Potential energy diagram of Ionic molecule - Cohesive energy – Born-Haber cycle – Characteristics of Ionic bonding.

Covalent bond – Covalent bond in hydrogen molecule - Characteristics – Directional nature and Hybridization of covalent bonds.

UNIT-III: Lattice vibration and phonons

Lattice vibration - Elastic vibration of continuous media - Group velocity of harmonic wave trains - Vibration in one dimensional atomic lattice – Lattices with two atoms per primitive cell - phonon – Momentum of phonon - Inelastic scattering of photons by long wavelength phonon – Inelastic scattering of neutrons by phonons.

UNIT-IV: Band theory and imperfections

Early free electron model - Wave equation in a periodic potential and Bloch theorem - Kronig penney model - Brillouin zones.

Classification of imperfection - Frenkel defect - Schottky defect - Color centers - Plastic deformation - Edge dislocation- Dislocation motion - Plane defect - Grain boundary.

UNIT-V: Superconductivity

Occurrence of superconductivity – Meissner effect - Persistent current – penetration depth - Type I and Type II superconductors - Isotope effect - Quantum tunneling – Josephson Effect – AC and DC Josephson effect - Thermodynamics of superconducting transition – London equation – BCS theory – SQUID.

Books for Study:

1. Solid state physics- Gupta kumar.
2. Solid state physics- R.K Puri and V.K.Babbar.
3. S.O. Pillai, Solid State Physics (New Age International, New Delhi, 1995).

Books for Reference:

1. Saxena-Gupta- Saxena, Fundamentals of Solid State Physics. Pragati Prakashan – Meerut, 2007.
2. C.Kittel, Introduction to Solid State Physics, Wiley Eastern, New Delhi, 1977.
3. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)**Time: 3 Hrs.****Max. Marks: 75****Section – A (10 X 2 = 20 Marks)****Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)**Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)**Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 PPH 206

CLASS: I-M.Sc., PHYSICS

CREDITS: 5

HOURS: 6 / Week

Semester – II

CC VI – QUANTUM MECHANICS

(For candidates admitted from 2018 onwards)

UNIT – I: Schrödinger Equation and General Formulation

Schrodinger Equation – Physical meaning and conditions on the wave function – Expectation values – Ehrenfest's theorem – Hermitian operators and their properties – Commutator relations – Uncertainty relation – Bra and Ket Vectors – Hilbert space – Schrodinger, Heisenberg and interaction pictures.

UNIT – II: Exactly Solvable Systems

Linear harmonic oscillator – Solving the one dimensional Schrodinger equation – Abstract operator method – Particle in a box – Square well potential – Rectangular barrier potential – Rigid rotator – Hydrogen atom.

UNIT – III: Approximation Methods

Time-independent perturbation theory: Non-degenerate (first order) and degenerate perturbation theories – Stark effect – WKB Approximation – Validity- Application to tunneling problem and quantization rules.

Time-dependent perturbation theory: Constant and Harmonic perturbations – Transition probability – Sudden approximation.

UNIT – IV: Angular momentum and identical particles

Angular momentum: Matrix representation of J – Spin angular momentum – Eigen values – Commutation relations of angular momentum operator – Addition of angular momenta – Clebsch-Gordan coefficients (basic ideas only) – Pauli matrices – Identical particles and spin – Symmetric and Antisymmetric wavefunctions.

UNIT –V: Relativistic Quantum mechanics

Klein-Gordan equation for a free particle – Charge and current densities – KG equation in an electromagnetic field – Dirac's relativistic equation for a free particle – Dirac matrices – Plane wave solution – Existence of electron spin (Spin angular momentum) – Spin-orbit energy – Zitterbewegung – Negative energy states of electron.

Books for Study:

1. Gupta Kumar Sharma – Quantum Mechanics , Kadharnath , Ramnath publications.
2. Satya prakash Swadi soluja – Quantum Mechanics , Kadharnath , Ramnath publications.
3. Devanathan – Quantum Mechanics
4. P.M.Mathews and K.Venkatesan – A Text Book of Quantum Mechanics, Tata Megraw Hill , New Delhi 1987.

Book for Reference:

1. L.Schiff – Quantum mechanics, Tata Mcgraw Hill , New Delhi 1968.
2. V.K.Thankappan – Quantum Mechanics, Wiley –Eastern , New Delhi , 1985.
3. J.Singh – Quantum Mechanics , Fundamentals and application to Technology, John Wiley , New York ,1997.
4. A.Goswami – Quantum Mechanics (W.C.Brown , Dupuque,1992)
5. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks : 75

**Section – A (10 X 2 = 20 Marks)
Answer ALL questions**

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

**Section – B (5 X 5 = 25 Marks)
Answer the following questions**

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

**Section – C (3 X 10 = 30 Marks)
Answer any THREE questions**

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PPHP 208

CLASS: I-M.Sc., PHYSICS

CREDITS: 3

HOURS: 8 / Week

Semester – II

CC VIII – PRACTICAL – II

(For candidates admitted from 2018 onwards)

(Any **Twelve** Experiments)

1. Determination of q, n, σ by Elliptical fringes method
2. Determination of q, n, σ by Hyperbolic fringes method
3. Young's modulus by Koenig's method
4. Determination of Stefan's constant
5. Planck's constant determination – Photoelectric effect
6. Rydberg's constant (Method I) – using Spectrometer
7. Determination of specific rotatory power of a liquid using Polarimeter
8. Determination of Energy gap using Thermistor
9. Determination of 'K' – Forbe's method
10. Hartmann's constant using Spectrometer (Scale and telescope method)
11. Anchor ring experiment
12. Determination of e / m of an electron by Thomson's method
13. Charge of an electron – Spectrometer
14. Anderson's bridge – Self inductance of a coil
15. Determination of Dielectric constant
16. Spectrometer – Biprism
17. Determination of dielectric loss using CRO
18. Identification of prominent lines by spectrum photography – Copper arc spectrum
19. Identification of prominent lines by spectrum photography – Iron arc spectrum
20. Identification of prominent lines by spectrum photography – Brass arc spectrum

**A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL,
MAYILADUTHURAI.
DEPARTMENT OF PHYSICS**

CODE:18 PPH 207

CLASS: I-M.Sc., PHYSICS

CREDITS: 5

HOURS: 6 / Week

Semester – II

CC VII – MICROPROCESSOR AND MICROCONTROLLER

(For candidates admitted from 2018 onwards)

UNIT-I: INTRODUCTION OF 8085 AND ARCHITECTURE

Introduction – Evolution of microprocessor – organization of microprocessor – features of different 8 bit microprocessors – Intel 8085 Architecture – pin configuration – ALU – Flags – Timing and control unit – registers – data and address bus – opcode and operands.

UNIT-II: INSTRUCTION SIZE, CYCLES AND SET

Instruction word size – Instruction cycles – Fetch operation – execute operation – Machine cycle and T-state – Timing diagram – Timing diagram for opcode fetch cycle – memory read – Memory write – addressing modes – Intel 8085 instructions – arithmetic group – Logical group – branch group – Memory mapped i/o scheme – I/o mapped i/o scheme – Memory and i/o interfacing.

UNIT-III: PERIPHERAL DEVICES AND MICROPROCESSOR APPLICATIONS

Programmable peripheral interface – Architecture of INTEL 8255A – operating modes – Control groups – control word – Programmable counter interval timer – INTEL 8253 – DMA controller – Programmable peripheral controller 8259 – programmable communication interface 8251(USART) – Delay subroutine – 7 segment LED display.

UNIT-IV: ASSEMBLY LANGUAGE PROGRAMS (8085 only)

Addition – subtraction – multiplication – division – choosing the biggest and smallest numbers from a list – ascending and descending orders – programs for time delay using single and pairs of registers – square wave generators – Traffic light controller – Stepper motor – Multiplexed seven segment display – Hexadecimal keyboard.

UNIT-V: MICROCONTROLLER 8051

Features of 8051 – comparison between microprocessor and microcontroller – Architecture – pin configuration – memory organization – External data and program memory – counters and timers – serial data input/output – interrupt structure – external interrupts – Addressing modes.

Books for study:

1. B.Ram, Fundamentals of microprocessor and microcomputers, Dhanpat Rai Publcn.,New Delhi,2006).
2. Vireshwar Sharma and Pradip kumar patel, Microprocessor and its interfacing (Vayu education of india pub., New Delhi,2011).
3. K.Ayala,The Microcontroller (Cengage learning India, New Delhi,2013,3rd edition).

Books for Reference:

1. R.Gaonkar, Microprocessor Architecture, programming and applications with 8085 (Penram International publishing, Mumbai,2006)5th edition.
2. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 EDPH 201

CLASS: I-PG

CREDITS: 2

HOURS: 4 / Week

Semester – II

EDC I – FACTS ON EVERYDAY PHYSICS

(For candidates admitted from 2018 onwards)

UNIT – I

Formation of mushroom shaped cloud after a nuclear bomb explosion – Humming (Sound) in thermos flasks – Working of an electric train –Speech Synthesizers and working principle – Working of train brake – Flickering on television screen when a vehicle crossed the road – Working of remote control in TV – Signal reception in dish antenna – Difference between hydrogen and atom bomb – Production of electricity from nuclear materials.

UNIT – II

Cause of death due to electric current – Reason for voltage of electric power always in multiple of 11 – Function of SIM card in a cellphone – Working of exhaust silencer – Difference between optical fibres and ordinary cables – Image change in a 3D hologram depending on angle of viewing – Diamond sparkle more than a glass – Reception of mobile signal in an aeroplane – Working of lightning arrester – Meaning of ozonised mineral water.

UNIT – III

Working of thermostat – Working of pressure cooker – Effect of temperature in a closed room when a Fridge is opened – Periodical production of sounds in a refrigerator – Cooking in microwave oven – Measurement of severity of earthquakes in Richter scale – Consumption of more current during low voltage – Significant character of earthing pin in 3-pin plugs – Production of humming sound in high tension wires – Reason for a bird not get electrocuted on a live wire.

UNIT – IV

Curvely nature of fan wings – Usage of sodium vapour lamp in streets – Role of chokes and starters in tube lights – Splitting of white light when passed through a prism – Reason for shadow bigger than an object – Reason for Tubelights not giving sharp shadows like filament bulbs – Making of permanent magnets – Satellite always launched from East coast – Reason for unbalance in stationary two wheeler – Global Positioning (GPS) and its working.

UNIT-V

Significance in the usage of gravels on railway tracks – Reason for not affecting aeroplanes by lightning – Reason for not travelling sound in vacuum – Reason for appearing Sun and Moon larger at the horizon – Reason for seeing only one side of the moon always – Formation of fire and its atomic structure – Reason for flames go upwards – Reason for not making ornaments with pure gold – Increasing effect of ink flowing when pens are about to run out of ink – Laptop monitor appear like a film negative when seen from the side.

BOOKS FOR STUDY:

The Hindu Speaks on Scientific Facts – Volume I & II – The Hindu Publication

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks : 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) – From Unit – I
- 12. (a) or (b) – From Unit - II
- 13. (a) or (b) – From Unit - III
- 14. (a) or (b) – From Unit - IV
- 15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

- 16. From Unit – I
- 17. From Unit – II
- 18. From Unit – III
- 19. From Unit – IV
- 20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PPH 309

CLASS: II - M.Sc., PHYSICS

CREDIT: 5

HOURS: 5 / Week

Semester – III

CC IX – ELECTROMAGNETIC THEORY

(For candidates admitted from 2018 onwards)

UNIT-I: Field equations and conservations laws

Equation of continuity – Displacement current – Maxwell's equations – Derivations --Poynting vector – Electromagnetic potential A and Φ - Maxwell's equations in terms of electromagnetic potentials – Non-Uniqueness of Electromagnetic potential – concept of Gauge-Lorentz gauge – Coulomb gauge.

UNIT -II: Plane Electromagnetic wave & their propagation

Electromagnetic waves in free space – Propagation of E.M.W in isotropic dielectrics – Propagation of E.M.W in Anisotropic dielectrics – Rayleigh resistance formula – The dynamic values of conductivity.

UNIT-III: Interaction of E.M.W. with matter on macroscopic scale

Reflection and Refraction of EMW-Fresnel formulae-Brewster's law and degree of polarization-Total internal reflection and critical angle-Propagation of EMW between conducting planes –TE waves-TM waves-TEM waves.

UNIT-IV: Interaction of E.M.W with matter on Microscopic scale

Introduction – scattering and scattering parameters – differential scattering cross-section – Total scattering cross section – state of polarization of scattered radiation – coherence and incoherence in scattered light – Dispersion: Normal and Anomalous – Dispersion in gases – Dispersion in liquids and solids.

UNIT-V: The field of Moving charges and Radiations

Retarded potential-Lienard wiechert potential-Field of a point charge in uniform rectilinear motion-Radiation from an accelerated charge particle at low velocity

Radiating system:

Oscillating electric dipole-Radiation from an oscillating dipole.

Books for study:

1. Electromagnetic theory – Chopra , Agarwal – K.Nath &co meerant-2007
2. Electromagnetic theory – Sathya Prakash

Books for Reference:

1. Introduction to Electrodynamics - D.Griffiths,prentice hall ,New Delhi -1999.
2. Electricity and Magnetism – AS. Mahajen, Rangwala.
3. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) – From Unit – I
- 12. (a) or (b) – From Unit – II
- 13. (a) or (b) – From Unit – III
- 14. (a) or (b) – From Unit – IV
- 15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

- 16. From Unit – I
- 17. From Unit – II
- 18. From Unit – III
- 19. From Unit – IV
- 20. From Unit – V

DEPARTMENT OF PHYSICS

CODE: 18 PPH 310

CLASS: II M.Sc., PHYSICS

CREDITS: 5

HOURS: 5 / Week

Semester – III

CC X – STATISTICAL MECHANICS

(For candidates admitted from 2018 onwards)

UNIT – I: CLASSICAL STATISTICS – I

Phase space – Ensembles – Micro canonical ensemble, Canonical ensemble and Grand canonical ensemble – Liouville's theorem – Statistical equilibrium – Microstates and macro states – Stirling's approximation – Thermodynamic probability – Most probable distribution.

UNIT – II: CLASSICAL STATISTICS – II

Classical Maxwell-Boltzmann distribution law – Maxwell's law of distribution of velocities – Doppler broadening of spectral lines – Principle of equipartition of energy – Calculation of gas pressure – Derivation for most probable speed, mean speed, mean square and root mean square speed from distribution law – Boltzmann's entropy relation.

UNIT – III: QUANTUM STATISTICS – I

Fermi-Dirac distribution law – Thermodynamic functions of degenerate Fermi Dirac gas – Compressibility of Fermi gas – Electron gas – Fermi energy - Free electron model and Electronic emission – Pauli's theory of paramagnetism.

UNIT – IV: QUANTUM STATISTICS – II

Bose-Einstein distribution law – Energy and Pressure of gas – Bose-Einstein condensation – Thermal Properties of Bose-Einstein gas – Black body radiation and the Planck's radiation law – Specific heat of solids – Dulong and Petit's law – Einstein's theory – Debye's theory.

UNIT – V: FLUCTUATIONS IN THERMODYNAMIC QUANTITIES AND PHASE TRANSITION

Fluctuations in energy, volume, pressure and enthalpy – Random walk – Brownian motion – Phase transition – First and Second order – Critical exponent – Yang and Lee theory – The Ising Model.

Books for study:

1. Statistical Mechanics – Gupta kumar and sharma
2. Statistical Mechanics – Sathya Prakash

Books for reference:

1. Statistical Mechanics - K. Huang, Wiley Eastern Ltd., New Delhi, 1963.
2. Statistical Mechanics – B. K. Agarwal and M. Eisner, Wiley Eastern Ltd., New Delhi, 1994.
3. Fundamentals of Statistical and Thermal Physics – F. Reif, Mc Graw Hill , Singapore, 1985.
4. Thermodynamics – N. Sears and L. Salinger, Narosa Publicn., New Delhi, 1989.
5. Thermodynamics and statistical mechanics – W. Greiner, L. Neise and H. Stocker, Springer Publicn., New York , 1995.
6. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) – From Unit – I
- 12. (a) or (b) – From Unit – II
- 13. (a) or (b) – From Unit – III
- 14. (a) or (b) – From Unit – IV
- 15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

- 16. From Unit – I
- 17. From Unit – II
- 18. From Unit – III
- 19. From Unit – IV
- 20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PPH 311

CLASS: II M.Sc., PHYSICS

CREDITS: 5

HOURS: 4/Week

Semester – III

CC XI – ATOMIC AND MOLECULAR SPECTROSCOPY

(For candidates admitted from 2018 onwards)

Unit I: Atomic Spectroscopy

Vector atom model – magnetic moments of an atom and Lande's g factor – Larmer's theorem – Stern Gerlach experiment – Fine structure of hydrogen lines – Alkali spectra – Spin-orbit interaction – Fine Structure – Transition rules – Intensity rules – LS & JJ coupling schemes – Zeeman (Normal and Anomalous) and Paschen Back effect (one and two electron systems) – Stark effect.

Unit II: Microwave Spectroscopy

The Rotation of Diatomic molecules – Theory – intensity of spectral lines – Effect of isotopic substitution – Non rigid rotator – Polyatomic molecules; Linear, symmetric top and asymmetric top molecules – Instrumentation techniques.

Unit III: Infrared Spectroscopy

Vibrating diatomic molecule – Theory – Anharmonic oscillator – Diatomic Vibration-rotation spectrum – Born Oppenheimer approximation – vibrations of polyatomic molecules – Linear and symmetric top molecules – Influence of nuclear spin – Experimental arrangements.

Unit IV: Raman Spectroscopy

Classical and Quantum theory of Raman effect – Pure rotational Raman spectra – Linear molecules – Symmetric top molecules – Spherical top molecules – Vibration Raman spectra – Rotational fine structure – Structural determination from Raman and infrared spectroscopy – Techniques and Instrumentation.

Unit V: NMR and ESR Spectroscopy

Introduction to NMR – Quantum description of NMR – Chemical shift – Measuring and Causes of chemical shift – Coupling constants – Instrumentation.

Introduction to ESR – Comparison between NMR and ESR – Theory of ESR – Instrumentation – Presentation of ESR spectrum – Hyperfine splitting – Determination of g factor – Applications of ESR spectroscopy.

Books for study:

1. C.N. Banwell, Fundamentals of Molecular Spectroscopy (McGraw Hill, New York, 1981).
2. Gupta kumar Sharma, Elements of spectroscopy (pragathi prakasan publicataion, Twentieth edition 2007).
3. Gurdeep R. Chatwal Sham K. Anand, (Atomic and Molecular) Spectroscopy (Himalaya Publishing House).

Books for Reference:

1. G. Aruldas, Molecular Structure and Spectroscopy (Prentice Hall, New Delhi, 2006).
2. D.N. Sathyanarayana, Vibrational Spectroscopy (New Age International, New Delhi, 2015).
3. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PPHP 312

CLASS: II M.Sc., PHYSICS

CREDITS: 3

HOURS: 8 / Week

Semester - III

CC XII - PRACTICAL - III

(For candidates admitted from 2018 onwards)

(Any 12 experiments)

1. Study the function of Multiplexer and Demultiplexer.
2. Study of the function of Decoder and Encoder.
3. Study of Shift registers (SIPO & SISO operations).
4. BCD to seven segment display.
5. Study of counter using IC 7490 (0-9 and 00-99).
6. IC 7490 as a Scale changer.
7. Simplification of Boolean equation using KMAP.
8. To construct combinational circuit using gates.
9. Determination of Hall coefficient – N type & P type
10. Michelson's Interferometer I – Determination & difference in wavelength.
11. Michelson's Interferometer II – Determination of thickness of thin Mica sheet.
12. ALO Band
13. Ultrasonic interferometer – Velocity of light in organic liquid.
14. Quincke's method
15. Guoy's method
16. LASER Experiment - Determination of particle size & wavelength of light.
17. Four probe method – Energy gap determination
18. Cauchy's constant
19. Polarizability of a given liquid using Spectrometer.
20. Rydberg's constant – Using grating and Prism.

(Any other equivalent experiments which have to be similar and standard)

DEPARTMENT OF PHYSICS

CODE: 18 PPHE 302

CLASS: II M.Sc., PHYSICS

CREDITS: 4

HOURS: 4/ Week

Semester – III

Elective II – PHOTONICS AND NANO PHYSICS

(For candidates admitted from 2018 onwards)

UNIT-I: Photoconductivity and Optoelectronic Devices

Luminescence: Principle, Classification & Applications – Photoconductivity: Characteristics – Photodetectors: Working & Applications.

Introduction to LED – Multicolour LED – LEDs in facsimile machines – Optical discs equipment – Printers using laser diodes – Hologram scanners.

UNIT-II: Synthesis of Nanomaterials

Synthesis of Nanomaterials: Top-down and bottom-up methods – Ball milling method – Physical approaches: Arc discharge method – Laser ablation – Chemical approaches: Chemical Vapour Deposition – Sol-gel synthesis.

UNIT-III: Properties of Nanomaterial

Properties of Nanomaterials: Mechanical, Optical and Electrical properties – Perspective of length – nanostructures in nature – quantum structures – quantum confinement – surface effects of nanomaterials.

UNIT-IV: Nanomaterials Characterisations

Characterisations: Scanning Electron Microscope – Transmission Electron Microscope – Scanning Tunneling Microscope – Atomic Force Microscope – Particle size analyser.

UNIT-V: Nanotubes and applications of Nanomaterials

Quantum dot – Quantum wire – Quantum well – Carbon Nanotubes: Fullerene – Single-walled nanotube – Multi-walled nanotubes – Applications in Medicine, Energy sector, Water purification, Communication sector & Environment.

Books for study:

1. A Text Book of Applied Electronics – R.S. Sedha, S. Chand & Co. (Unit –I).
2. Material Science – V. Rajendran, A. Marikani, Tata McGraw-Hill (Unit –I).
3. Principles of Nanoscience & nanotechnology – M.A. Shah & Tokeer Ahmad, Narosa Publishing House (Unit–II, III, IV & V).

Books for reference:

1. Nanotechnology – Mick Wilson, Kamali Kannangara, Geoff Smith & others, Overseas Press.
2. Nano:The essentials – T. Pradeep, Tata MCGraw Hill Pvt.
3. NPTEL Lecture Series

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) – From Unit – I
- 12. (a) or (b) – From Unit – II
- 13. (a) or (b) – From Unit – III
- 14. (a) or (b) – From Unit – IV
- 15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

- 16. From Unit – I
- 17. From Unit – II
- 18. From Unit – III
- 19. From Unit – IV
- 20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE:18 EDPH 302

CLASS: II – PG

CREDITS: 2

HOURS: 4/Week

Semester – III

EDC – II - FUNCTIONAL PHYSICS

(For candidates admitted from 2018 onwards)

Unit-I

Working of air conditioner – Working principle of an aero plane – Working of a mobile phone – Working of an atomic clock – Operation of bio sensors – Possibility of transmission of number of channels in a single cable – Function of carburetor – Working principle of a camera – Physics behind computer tomography – Function of a currency counting machine.

Unit-II

Storing of information in a digital video disc – Working of speedometers and odometers – Working principle of bar codes – Working of elevators and escalators – Working principle of photocopier – Function of computer stimulation technique – Principle of fire extinguisher – Working of a hard disk – Working of liquid crystals.

Unit-III

Working of RADAR – Working principle of a periscope – Storage of Magnetic Tape (audio and video) recordings – Function of Zippers – Existence of Magnetic properties of earth – Explanation of fourth dimension – Consumption of low electricity by CFL – Making of Polaroid sun glasses – Difference between air brake and hydraulic brake – Origin of gravity.

Unit-IV

Difference between mass and weight – Darkening of photo chromatic glass when exposed to sun light – Pulling sensation when we stand near a running train – Working of Magnetic levitation – Difference between radar and sonar – Exclusive properties of silicon that have enabled its usage in electronics – Techniques behind to pull than to push a lawn roller – Superconductivity – Reason for bordering of black stripe in a color TV screen.

Unit-V

Measurement of speed of a computer – Making of permanent magnet – Principle behind the breath analyzer used to detect drunken-drivers – Significance of Sriharikota as place for launching rockets – Working of hearing aids – Difference between horse power and brake horse power – Working of biological weapon – Cleaning of clothes in dry cleaning – Production of different colors in fireworks.

Books for study

1. The Hindu speaks on scientific facts –Volume I & II –The Hindu Publication – Kasturi & sons Ltd, 859-860, Anna salai, Chennai 600002.
2. How things work? - Bright careers institute, 1525, Nai sarak, Delhi – 110 006. (INDIA).

Web site: www.brightcareers.com

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit - II
13. (a) or (b) – From Unit - III
14. (a) or (b) – From Unit - IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

DEPARTMENT OF PHYSICS

CODE: 18 PPH 413

CLASS: II M.Sc., PHYSICS

CREDIT: 5

HOURS: 6 / Week

Semester – IV

CC XIII – NUCLEAR AND PARTICLE PHYSICS

(For candidates admitted from 2018 onwards)

Unit –I: General properties of nuclei

Size-Shape and charge distribution-Parity-Quantum numbers and nucleon states-Nuclear spin and angular momentum-Nuclear magnetic moment-Stability of nuclei-Binding energy-Semi empirical mass formula-The Deuteron general characteristics-Ground state of Deuteron-Preamble to nucleon –nucleon scattering process-Experimental data on low energy n-p scattering.

Unit –II: Forces and Models

Nature of the nuclear forces-Charge Independence of Nuclear force-Charge symmetry of nuclear forces-Saturation of nuclear forces-Meson theory of nuclear forces -Nuclear shell model- Extreme single particle model-Square well potential-single particle-Shell model-Collective model-Liquid drop model

Unit–III: Reactions and Radioactivity

Nuclear reaction:The Q-equations –Compound nucleus-Fission:Bohrwheelers theory of nuclear fission-Fusion: solar fusion

Theory of α decay -Three forms of β decay--Fermi theory of beta decay-Gamma emission-Multiple radiation-selection rules for α , β , γ –Nuclear Isomerism.

Unit–IV: Measurement and detection of nuclear radiations

Introduction-behaviour of ion-pairs in electric fields-Ionization chamber-proportional counter-Geiger muller counter -properties of quenching gas-Scintillation counter-physical mechanism involved in the scintillator-cherenkov radiation and detector-nuclear emulsion-cloud chamber-diffusion cloud chamber-Bubble chamber-Spark chamber.

Unit –V: Elementary particles

classification of fundamental forces, elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness)-Gellmann-Nishijia formula-Quark model-Baryons and Mesons-CPTinvariance-Application of symmetry arguments to particle reactions-Parity non-conservation in weak interaction.

Books for study:

1. Nuclear Physics – R. C. Sharma
2. Nuclear Physics – Pandya and Yadhav

Books for Reference:

1. K.S.Krane, Introductory Nuclear Physics (John–Wiley, New York, 1987).
2. S.B.Patel, Nuclear Physics, An Introduction (Wiley–Eastern, New Delhi, 1991).
3. B.L. Cohen, Concepts of Nuclear Physics (Tata Mcgraw Hill , New Delhi , 1991).

4. H.S. Hans , Nuclear Physics: Experimental and Theoretical (New Age International Publishers , New Delhi , 2001)
5. D.C. Cheng and G.K. O'Neill , Elementary Particle physics: An Introduction (Addision-Wesley,1979)
6. D. Griffiths, Introduction to Elementary Particles (Wiley International, New York, 1987).
7. Nuclear Physics – D. C. Tayal.
8. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

DEPARTMENT OF PHYSICS

CODE: 18 PPH 414

CLASS: II M.Sc., PHYSICS

CREDITS: 5

HOURS: 6 / Week

Semester – IV

CC XIV – ANALYTICAL METHODS IN PHYSICS

(For candidates admitted from 2018 onwards)

UNIT – I: Group Theory

Concept of a group – Abelian group – Cyclic group – Multiplication table – Subgroups – Cosets – Classes – Point groups and Space groups – Homomorphism and Isomorphism – Reducible and irreducible representations – Schur’s lemma – The great orthogonality theorem – Character tables – C_{2v} .

UNIT – II: Numerical solution of algebraic and transcendental equations

Method of successive approximation – Regula falsi method – Newton–Raphson method – Rate of convergence and Condition for convergence.

Simultaneous linear algebraic equations

Gauss elimination method – Jordan’s modification – Gauss–Seidel method of iteration.

UNIT – III: Interpolation

Gregory – Newton forward and backward interpolation formula – Central difference interpolation formula – Gauss forward and backward interpolation formula – Divided differences – Properties – Newton’s interpolation formula for unequal intervals – Lagrange’s interpolation formula.

UNIT – IV: Numerical differentiation and integration

Newton’s forward and backward difference formula to compute derivatives – Trapezoidal rule – Simpson’s rule – Extended Simpson’s rule.

Numerical Solutions of ordinary differential equations

N^{th} order ordinary differential equations – Solution of Taylor series – Euler’s method – Improved Euler’s method – Runge-Kutta method – second and fourth order – Runge-Kutta method for solving first order differential equations.

UNIT – V: Numerical analysis using C Programming

Method of successive approximation – Newton–Raphson method – Gauss elimination method – Lagrange’s interpolation formula – Trapezoidal rule – Simpson’s rule – RK fourth order method – Euler’s method.

Books for study

1. Numerical Methods in Science and Engineering – Dr. M.K. Venkataraman – The National Publishing Co. Madras.
2. Numerical Methods – A. Singaravelu – Meenakshi Publications.
3. Mathematical Physics – Satya Prakash – S.Chand and sons
4. Numerical Methods – S. Arumugam, A. Thangapandi Isaac, A. Somasundaram – Scitech Publications Ltd, Chennai.

Books for Reference

1. Introductory Methods of Numerical analysis – S.S. Sastry, Prentice – Hall of India, New Delhi (2003) 3rd Edition.
2. (2001).
3. Numerical Recipes in C, W.H. Press, B.P.Flannery, S.A.Teukolsky, W.T. Vetterling, Cambridge University (1996).
4. Monte Carlo : Basics, K.P.N. Murthy, ISRP, Kalpakkam, 2000.
5. Numerical Methods in C and C++, Veerarajan, S.Chand, New Delhi (2006).
6. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks) Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks) Answer the following questions

11. (a) or (b) – From Unit – I
12. (a) or (b) – From Unit – II
13. (a) or (b) – From Unit – III
14. (a) or (b) – From Unit – IV
15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks) Answer any THREE questions

16. From Unit – I
17. From Unit – II
18. From Unit – III
19. From Unit – IV
20. From Unit – V

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
DEPARTMENT OF PHYSICS

CODE: 18 PPHP 415

CLASS: II M.Sc., PHYSICS

CREDITS: 4

HOURS: 8 / Week

Semester – IV

CC XV – PRACTICAL-IV

(For candidates admitted from 2018 onwards)

(Any 12 experiments)

1. 8 – Bit addition, subtraction, multiplication and division using 8085.
2. 16 – Bit addition, 2's complement and 1's complement subtraction using 8085.
3. Conversion from Decimal to Hexadecimal and Octal number systems.
4. Conversion from Hexadecimal, Octal to Decimal number systems.
5. Study of 7 – segment display add-on board.
6. Traffic control system using Microprocessor.
7. Control of Stepper motor using Microprocessor.
8. Microprocessor interface – Digital to Analog converter
9. To arrange a set of numbers in ascending and descending order.
10. Largest and Smallest of 'N' numbers.
11. To find the root of a given equation using Method of successive approximation.
12. To find the root of a given equation using Newton – Raphson method.
13. To find the solution of linear equation using Gauss elimination method.
14. To find the Hartmann's constant and the wavelength of the spectral lines.
15. To find the value of 'y' from the given set using Lagrange's interpolation formula.
16. To evaluate integrals using Trapezoidal rule.
17. To evaluate integrals using Simpson's rule.
18. To solve ordinary differential equation using RK fourth order method.
19. To solve ordinary differential equation using Euler's method.
20. To find the biggest and smallest number in a given array.

(Any other equivalent experiments which have to be similar and standard)

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

DEPARTMENT OF PHYSICS

CODE: 18 PPHE 403

CLASS: II - M.Sc., PHYSICS

CREDITS: 4

HOURS: 4/ Week

Semester – IV

Elective-III - ADVANCED MATERIALS SCIENCE

(For candidates admitted from 2018 onwards)

UNIT – I: New materials

Metallic glasses – Fiber reinforced plastics and metals – Metal matrix composites – Surface acoustic wave materials – Ceramics – Cermets – High temperature materials – Nuclear engineering materials – SMART materials.

UNIT – II: Crystal growth phenomena

Introduction – Nucleation – Classification of nucleation – Classical theory of nucleation – Gibbs-Thomson equation for vapour, melt and solution – Energy of formation of a nucleus – Spherical nucleus – Cylindrical nucleus – Cap-shaped nucleus – Kinetics of crystal growth – Singular and rough faces.

UNIT – III: Solution growth

Low temperature growth: Solution, solubility and super solubility – Meir's solubility diagram – Methods of crystallization: Slow cooling, Solvent evaporation and Temperature gradient method – Crystal growth system: Constant temperature bath, Crystallizer, Filtration assembly and Seed mount platform.

Gel growth: Principle – Structure of gel – Single diffusion method.

UNIT – IV: Melt growth

Basics of melt growth – Growth techniques: Bridgman-Stockbarger method – Crystal pulling: Czochralski method – Zone refining: Principle and technique – Skull melting Process – Verneuil method – Heat exchanger method.

UNIT – V: Vapour growth

Basic principle – Physical vapour deposition – Chemical vapour deposition – Advantages and disadvantages – Chemical vapour transport: Fundamentals – Choice of transport Reaction – Stationary temperature profile – Linearly time varying temperature profile – Oscillating temperature profile – Advantages and Limitations.

Books for study:

1. Crystal Growth processes and methods – P.Santhana Raghavan, P. Ramasamy, KRU Publications (Units: II, III, IV & V).
2. Materials science – M. Arumugam, Anuradha Publications (Unit – I).
3. Materials science – V. Rajendran and A. Marikani, Tata Mcgraw-Hill Publications.

Books for Reference:

1. Crystal Growth - Buckley, H. E, Chapman and Hall, London(1952).
2. Crystal Growth in Gels - Heinz K. Henisch, Dover publications (1996).
3. Crystal Growth, Morphology and performance - Ichiro Sunagawa, Cambridge University press, (2005).
4. Crystal Growth processes - Brice, J. C.Halsted press, John Wiley & sons, New york (1986).
5. NPTEL VIDEO LECTURES

QUESTION PAPER PATTERN (From 2018 onwards)

Time: 3 Hrs.

Max. Marks: 75

Section – A (10 X 2 = 20 Marks)

Answer ALL questions

- 1 & 2. From Unit – I
- 3 & 4. From Unit – II
- 5 & 6. From Unit – III
- 7 & 8. From Unit – IV
- 9 & 10. From Unit – V

Section – B (5 X 5 = 25 Marks)

Answer the following questions

- 11. (a) or (b) – From Unit – I
- 12. (a) or (b) – From Unit – II
- 13. (a) or (b) – From Unit – III
- 14. (a) or (b) – From Unit – IV
- 15. (a) or (b) – From Unit – V

Section – C (3 X 10 = 30 Marks)

Answer any THREE questions

- 16. From Unit – I
- 17. From Unit – II
- 18. From Unit – III
- 19. From Unit – IV
- 20. From Unit – V