

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305

DEPARTMENT OF PHYSICS

Scheme for the *B.Sc., Students*

From 2015 – 2016 Onwards

Semester	Courses	Hours	Credits	Total Credits
I	LC I	6	3	20
	ELC I	6	3	
	CC I – Properties of matter and acoustics	5	5	
	CC II – Major Practical - I	2	2	
	AC I – Mathematics – I	9	5	
	SBC I – Basic Physical measuring instruments	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	
	SBC II – Trouble Shooting Electronic equipments	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 III – House wiring and Electric motors	2	2	

IV	LC IV	6	3	20
	ELC IV	6	3	
	CC VII – Electricity and Magnetism	5	5	
	CC VIII – Major Practical - IV	2	2	
	AC V – Chemistry – II	7	4	
	AC VI – Chemistry Practical – II	2	1	
	NMEC I – Non Conventional energy Resources	2	2	
V	CC IX – Optics and Spectroscopy	5	5	31
	CC X – Atomic and Nuclear Physics	5	5	
	CC XI – Analog Electronics	4	4	
	CC XII – Major Practical - V	6	4	
	EC I – Computer Programming in C	3	5	
	EC II – Energy Physics	2	3	
	NMEC II – Physics in everyday life	2	2	
	SSD I – Soft Skills Development	2	2	
	EA I – Gender Studies	1	1	
VI	CC XIII – Theoretical Physics	5	5	28
	CC XIV – Material Science	5	5	
	CC XV – Digital Electronics	5	5	
	CC XVI – Major Practical - VI	6	4	
	EC III – Microprocessor	5	5	
	VBC – Human Values & Ethics	2	2	
	ES – Environmental Studies	2	2	
	EA II	-	1	1
TOTAL			140	

HOD of Physics

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PH 101

CLASS : I B.Sc., PHYSICS

Semester – I

CC I – PROPERTIES OF MATTER AND ACOUSTICS

(For candidates admitted from 2015 onwards)

UNIT – I

Hooke's law – Stress–Strain diagram – Elastic moduli – Relation between elastic constants – Poisson's ratio – Expressions for Poisson's ratio in terms of elastic constants – Work done in stretching and twisting a wire – Twisting couple on a cylinder – Rigidity modulus by static torsion – Torsional pendulum – Rigidity modulus and moment of inertia.

UNIT – II

Cantilever – Expression for bending moment – Theory of Cantilever – Cantilever oscillations – Expression for time period – Theory and Experiment to find Young's modulus – Non-uniform bending and Uniform bending (Pin and microscope)-**I-section girders**

UNIT – III

Surface tension – Excess of pressure over curved surfaces – Applications of surface tension – spherical, cylindrical drops and bubbles – Drop weight method – Variation of surface tension with temperature – Jaegar's method.

Co-efficient of viscosity and its dimensions –Poiseuille's formula – Poiseuille's method for determining the co-efficient of viscosity of a liquid – Stoke's method – Variation of viscosity with temperature –**Lubricants.**

UNIT – IV

Simple harmonic motion – composition of SHM - **Lissajous figures** - Free, Damped, Forced vibrations and Resonance – Intensity and Loudness of sound – Decibels – Intensity levels – Noise pollution.

UNIT – V

Production of Ultrasonic waves – Piezo-electric crystal method – Magnetostriction method – Detection – Properties – Application to science, industry and medicine.

Reverberation and time of reverberation – Absorption coefficient – Sabine's formula – Measurement of reverberation time – Acoustic aspects of halls and auditoria.

Books for Study:

1. BrijLal & Subramanian – Properties of matter – Eurastia Publishing Co., New Delhi.
2. R.Murugesan – Properties of matter – R.Chand & Co. Pvt. Ltd., New Delhi.
3. BrijLal & Subramanian – Text book of Sound – Vikas Publishing House, New Delhi.

Books for Reference:

1. R.Murugesan and Kiruthiga Sivaprasath – Properties of matter and Acoustics – 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 2015 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)

DEPARTMENT OF PHYSICS

CODE : 15 PHP 102

CLASS : I B.Sc., PHYSICS

Semester – I

CC II – MAJOR PRACTICAL - I

(For candidates admitted from 2015 onwards)

(Any EIGHT 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 – Torsional 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. Verification of three laws of transverse vibrations – Sonometer.
10. **Viscosity of a liquid- Poissullie's method.**

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 SPH 101

CLASS : I B.Sc., PHYSICS

Semester – I

SBC I – BASIC PHYSICAL MEASURING INSTRUMENTS

(For candidates admitted from 2015 onwards)

UNIT-I

Physical measuring instruments: Vernier calipers – Screw gauge – Mass: Physical balance – weight: Spring balance – Optical instruments : Microscope – Telescope

UNIT-II

Measurements of thermo emf- Thermo couple- Thermometers-mercury-Alcohol-platinum resistance.

UNIT-III

Ohm's law – Kirchoff's laws – Heating effect of current – Electric iron heater – Transformer – step up and step down- Auto transformer.

UNIT-IV

Electrical measuring instruments-working principles-Galvanometer-Voltmeter-ammeter conversion-

UNIT-V

Conductors – Semiconductors – Insulators – Diodes - Transistors and IC's (Basic ideas only) – LED– Seven segment display .

BOOKS FOR STUDY:

1. B.L. Theraja- Electrical Technology
2. H. S. KALSI – Electronic Instrumentation.

PATTERN OF QUESTION PAPER (Max. Marks : 75)

Section- A (5 x 15 = 75)

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

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PH 203

CLASS : I B.Sc., PHYSICS

Semester – II

CC III – MECHANICS AND RELATIVITY

(For candidates admitted from 2015 onwards)

UNIT – I

Projectiles – Trajectory – Range in horizontal and inclined plane – Impulse – Impact – Impulsive forces – Laws of impact – Impact of a smooth sphere on a smooth horizontal plane – Direct and Oblique impact – Loss of K.E. – Motion of two interacting bodies – Reduced mass – Velocity and acceleration of centre of mass – Determination of motion of individual particle.

UNIT – II

Moment of Inertia – Kinetic energy of a rotating body - Moment of Inertia of a disc, Solid Sphere, spherical shell and cylinder - Compound pendulum – Determination of g - Radius of gyration - Minimum period - Kater's pendulum – Bessel's formula - Determination of moment of inertia of a flywheel.

UNIT – III

Newton's law of gravitation – Boy's method of determination of G – Gravitation potential and field due to spherical shell, solid sphere and hollow sphere – Centre of gravity of solid and hollow hemisphere.

UNIT – IV

Fluid pressure and its properties – Thrust on a plane and curved surfaces – Centre of pressure – Centre of pressure of a rectangular, triangular and circular lamina – Floating body – Meta centre – Determination of meta centric height of a ship – Equation of continuity – Euler's equation for unidirectional flow – Bernoulli's theorem – Venturimeter.

UNIT – V

Newtonian relativity – Galilean principles of relativity – Inertial frames – Michelson-Morley experiment and its significance – Postulates of special theory of relativity – Lorentz transformation equation – Time dilation – Length Contraction – Addition of velocities – Variation of mass with velocity – Einstein's Mass-energy relation.

Books for study:

1. M.Narayanamoorthy – Dynamics and Statics.
2. R.Murugesan – Mechanics and Mathematical methods.
3. C.L.Arora – Mechanics and Relativity.

Books for Reference:

1. J.B.Rajam – Modern Physics.
2. D.S.Mathur – Mechanics.
3. Engineering mechanics – Vaidyanathan. S

QUESTION PAPER PATTERN (From 2015 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)

DEPARTMENT OF PHYSICS

CODE : 15 PHP 204

CLASS : I B.Sc., PHYSICS

Semester – II

CC IV – MAJOR PRACTICAL - II

(For candidates admitted from 2015 onwards)

(Any EIGHT 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 method.
3. Determination of 'g' and 'k' – Compound Pendulum.
4. Surface Tension and Interfacial Surface Tension – Drop weight method.
5. **Sonometer- Frequency of AC mains.**
6. Specific Resistance of a given coil – Metre Bridge.
7. Determination of Thermal Conductivity of a bad conductor – Lee's disc method.
8. Thickness of thin wire – Air Wedge.
9. **Comparison of viscosities of two given liquids – Capillary flow method.**
10. Temperature Co-efficient of resistance – Metre Bridge.

A.V.C. COLLEGE (AUTONOMOUS)
DEPARTMENT OF PHYSICS

CODE : 15 SPH 202

CLASS : I B.Sc., PHYSICS

Semester – II

SBC II – TROUBLE SHOOTING – ELECTRONIC EQUIPMENTS

(For candidates admitted from 2015 onwards)

UNIT-I

Equipment failure – Cause of equipment failure – Nature of faults – Troubleshooting process – Fault finding aids – Troubleshooting techniques.

UNIT-II

Multimeter – Analog and Digital multimeters – CRO – Pulse generators – Power supplies.

UNIT-III

Hard tools – Soft tools – Soldering tools – Soldering procedure – Soldering & desoldering techniques – Safety precautions.

UNIT-IV

Resistors – color coding- testing Faults in resistors –Capacitors – Failure of Capacitors – Testing of capacitors – color coding identification.

UNIT-V

Testing of semiconductor devices using multimeter-Testing faults in junction and zener diodes- Transistor polarity identification-NPN and PNP.

BOOKS FOR STUDY:

1. R. S. Khandpur – Troubleshooting Electronic equipments – Tata Mc Graw Hill.
2. R. G. Gupta – Electronic instruments and systems (Principles, Maintenance and Troubleshooting) – Tata Mc Graw Hill.

PATTERN OF QUESTION PAPER (*Max. Marks : 75*)

Section- A (**5 x 15 = 75**)

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

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 APH 101

CLASS : I B.Sc., Maths

Semester – I

AC - I – ALLIED PHYSICS – I

(For candidates admitted from 2015 onwards)

UNIT – I

Gravitation – Newton’s law – Determination of G by Boy’s method – Centre of gravity – Centre of gravity of solid hemisphere – Moment of Inertia – M.I of solid cone – K.E of rotation – Acceleration of a body rolling down an inclined plane.

UNIT – II

Bending moment – Young’s modulus – Uniform and Non-uniform bending – Rigidity modulus – Couple per unit twist – Torsional pendulum – Surface Tension – Surface tension by Drop weight method – Viscosity – Comparison of viscosities by Burette method.

UNIT – III

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

UNIT – IV

Interference – Air wedge – Diffraction – Plane transmission grating – Normal incidence – Polarization – Optical activity – Specific rotation – Laurent’s half shade polarimeter – Specific rotation of sugar solution.

Spherical and chromatic aberration in lenses – Methods of minimizing spherical and chromatic aberration in lenses.

UNIT – V

Velocity of sound in gases – Newton – Laplace’s formula – Effect of pressure, temperature and humidity on the velocity of sound in gas- Acoustics of buildings – Reverberation – Sabine’s formula only and its importance – Factors affecting audibility.

Ultrasonics – production – Piezo-electric method – Detection – Properties – 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).
5. M.N.Srinivasan – Text book of Sound – Himalaya Publications.

QUESTION PAPER PATTERN (From 2015 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)

DEPARTMENT OF PHYSICS

CODE : 15 APHP 102

CLASS : I B.Sc., Maths

Semester – I

AC – II -ALLIED PHYSICS PRACTICAL – I

(For candidates admitted from 2015 onwards)

(Any EIGHT 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. Surface tension and Interfacial Tension by Drop weight method.
4. Rigidity modulus of the material of a wire
- Torsional Pendulum.
5. Potentiometer – Calibration of low range voltmeter.
6. Spectrometer – Refractive index of the prism.
7. Figure of merit – Table galvanometer.
8. Meter Bridge – Specific Resistance.
9. Junction diode characteristics.
10. Air wedge- thickness of a thin wire.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE :15 APHP 204

CLASS : I B.Sc., Maths

Semester – II

AC – IV -ALLIED PHYSICS PRACTICAL – II

(For candidates admitted from 2015 onwards)

(Any EIGHT experiments.)

1. Co-efficient of viscosity – Burette method - Poiseuille's formula.
2. Thermo-emf by direct deflection method.
3. Young's modulus of the material of a beam - Uniform bending – Pin & Microscope method.
4. Rigidity modulus of the material of a rod - Static Torsion.
5. Potentiometer – Internal resistance of a primary Cell.
6. Basic logic Gates using discrete components.
7. Spectrometer – Refractive index of the Liquid.
8. Newton's rings – Radius of curvature.
9. Carey Foster's bridge – Specific Resistance
10. Zener Diode characteristics.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 APH 203

CLASS : I B.Sc., Maths

Semester – II

AC – III -ALLIED PHYSICS – II

(For candidates admitted from 2015 onwards)

UNIT – I

Gauss's theorem–Capacitor – Energy of charged capacitor – Loss of energy due to sharing of charges – Capacity of parallel plate capacitor – Kirchoff's laws – Wheatstone's bridge – Carey Foster's bridge – Determination of temperature coefficient of resistance.

UNIT – II

Magnetic induction – Intensity of magnetization – Permeability and susceptibility – Cycle of magnetization – Hysterisis – B-H curve by magnetometer method – Laplace's law – Biot-Savart law – Force on a Straight conductor carrying current - Field along the axis of the circular coil carrying current.

UNIT – III

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 – G.M counter – Nuclear fission and fusion – Thermonuclear reactions.

UNIT – IV

PN junction diode – Forward and Reverse biasing – Characteristics of junction diode – LED – Zener diode – Zener diode as voltage regulator – Transistor – Working – Configuration – CB and CE modes – Transistor biasing – IC fabrications–monolithic diode.

UNIT – V

Number system (conversions for whole numbers) – Binary to Decimal – Decimal to Binary – Hexa Decimal to binary- Decimal to Hexa Decimal– Basic logic gates – using discrete components – Universality of NAND and NOR gates –De-Morgan's theorem – Boolean algebra – simplifications –EX-OR gate – Half adder.

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 2015 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)

DEPARTMENT OF PHYSICS

CODE : 15 APHP 204

CLASS : I B.Sc., Maths

Semester – II

AC – IV -ALLIED PHYSICS PRACTICAL – II

(For candidates admitted from 2015 onwards)

(Any EIGHT experiments.)

1. Co-efficient of viscosity – Burette method - Poiseuille's formula.
2. Thermo-emf by direct deflection method.
3. Young's modulus of the material of a beam - Uniform bending – Pin & Microscope method.
4. Rigidity modulus of the material of a rod - Static Torsion.
5. Potentiometer – Internal resistance of a primary Cell.
6. Basic logic Gates using discrete components.
7. Spectrometer – Refractive index of the Liquid.
8. Newton's rings – Radius of curvature.
9. Carey Foster's bridge – Specific Resistance
10. Zener Diode characteristics.

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

DEPARTMENT OF PHYSICS

CODE : 15 PH 305

CLASS : II B.Sc., PHYSICS

Semester – III

CC V – HEAT AND THERMODYNAMICS

(For candidates admitted from 2015 onwards)

UNIT – I

Platinum resistance thermometer – Callender & Griffith's bridge – Specific heat capacity of solids – Dulong & Petit's law – Specific heat capacity of liquid – Newton's law of cooling- Joule's electrical method –Barton's correction–Specific heat capacity of gases – C_p by Regnault's method and C_v by Jolly's differential steam calorimeter method.

UNIT – II

Zeroth , First and Second laws of thermodynamics –Carnot engine – Diesel cycle – Derivations of Maxwell's thermodynamic relations – Clapeyron's latent heat equation -Entropy– change of entropy for reversible and irreversible processes-Third law of thermodynamics.

UNIT – III

Joule-Kelvin effect – Porous plug experiment – Liquefaction of gases – Liquefaction of air – Linde's process – Liquefaction of hydrogen – Liquefaction of helium – K.Onne's method – Adiabatic demagnetization(Experimental set up only).

UNIT – IV

Coefficient of thermal conductivity – Rectilinear flow of heat along a bar – Forbe's method of finding K – Lee and Charlton's method for bad conductors – Statement and derivation of Stefan's law – Derivation of Newton's law of cooling from Stefan's law – Determination of Stefan's constant (laboratory method).

UNIT – V

Statistical equilibrium – Maxwell-Boltzmann distribution law – MB distribution in terms of temperature – Ideal gas – Quantum statistics – Phase space – Fermi-Dirac distribution law – Bose-Einstein distribution law – Comparison of the three statistics.

Book for Study:

1. Brijlal and Subramaniam –Heat and thermodynamics –S. Chand and co, 2000.

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.

QUESTION PAPER PATTERN (From 2015 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 : 15 PHP 306

CLASS : II-B.Sc., PHYSICS

Semester – III

CC VI – MAJOR PRACTICAL - III

(For candidates admitted from 2015 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. Rigidity modulus of the material of a wire – Torsional Pendulum.
6. Post office Box- measurement of specific resistance.
7. Moment of a magnet – Field along the axis of a coil.
8. Specific Resistance of a given coil – Carey Foster Bridge.
9. Radius of Curvature of a given lens – Newton’s Rings.
10. Young’s modulus of the material of a beam – Koenig’s method.

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

DEPARTMENT OF PHYSICS

CODE : 15 SPH 303

CLASS : II - B.Sc., PHYSICS

Semester – III

SBC III – HOUSE WIRING & ELECTRIC MOTORS

(For candidates admitted from 2015 onwards)

UNIT – I

Wires – sizes of wires – Types of wires – Rubber covered, taped-braided and Compounded or V.I.R wires – Lead alloy sheathed – T.R.S or C.T.S – Weather proof – Flexible wires – Wires splicing and termination – Western union splice or Twist splice – Married joint.

UNIT – II

Switches – Types of switches – Surface switch – Flush switches – Pull switches – Grid switches – Architrave switch – Rotary snap – Push button – Iron clad water tight – Quick break knife switch – Lamp holders – Switched bayonet cap lamp holder – Swivel lamp holders – Ceiling roses – Plugs – Socket outlets.

UNIT – III

Main switch – Splitter units – Distribution fuse boards – Neutral links – Fuses – Principle of operation of fuse – Selection of fuse wire – importance – Melting points of various metals and alloys – Silver as a fusing element – Copper as fuse wire.

UNIT – IV

DC motors – Construction – Working principle – Efficiency of motor – Types of DC motors – DC shunt motors – DC series motor – DC compound motor – Back emf – Torque of electric motor – Torque characteristics – Starting resistance – Speed controls.

UNIT – V

Characteristics of shunt motor – Characteristics of series motor – Losses in DC machine – Application of shunt, series and compound motor – Single phase induction motors – Construction and non-self starting split phase resistance – phase induction motor.

BOOKS FOR STUDY:

1. S. L. UPPAL – Electrical wiring, estimating and costing.
2. R. Muthusubramanian, S. Salivahanan and K.A. Muraleedharan – Basic electrical, electronics and computer engineering.

BOOKS FOR REFERENCE:

1. C.L. Arora – House wiring.
2. B.L. Theraja, A.K. Theraja – A textbook of electrical technology.
3. Anwani – Basic electrical engineering.

PATTERN OF QUESTION PAPER (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 : 15 PH 407

CLASS : II-B.Sc., PHYSICS

Semester – IV

CC VII – ELECTRICITY AND MAGNETISM

(For candidates admitted from 2015 onwards)

UNIT – I

Gauss theorem – Applications- infinite plane sheets- Coulomb's theorem – Force on the surface of a charged conductor – Energy stored in an electric field- Energy of a charged conductor – Loss of energy due to sharing of charges – Capacity of a parallel capacitor – Effect of introducing dielectric slab – Types of capacitors (Paper, Mica, Ceramic, Air and Electrolytic).

UNIT – II

Magnetic induction – Intensity of magnetization – Permeability – Susceptibility – Relation between them – B-H curve – Magnetometer method – Cycle of magnetization – Hysteresis loss – Importance of Hysteresis curves – Hard and soft magnetic materials- Properties of Dia, para and ferro magnetic materials.

UNIT – III

Fleming's left hand rule – Laplace's law – Field along the axis of a circular coil and solenoid – Theory of ballistic galvanometer – Damping correction – Charge sensitivity (Figure of merit).

Kirchoff's laws – Condition for Wheatstone's bridge – Carey Foster's bridge- specific resistance and temperature coefficient of resistance- Potentiometer- principle- measurement of resistance.

UNIT – IV

Faraday's Laws of electromagnetic induction – Expression for induced emf – Self inductance of a long solenoid – Energy stored in an inductance – Determination of self inductance by Rayleigh's method – Coefficient of mutual inductance of a pair of coaxial solenoids – Determination of mutual inductance – Eddy current and its uses – Maxwell's equations- Poynting Vector.

UNIT – V

Growth and decay of current in an LR circuit – Growth and decay of charge in a CR circuit – Determination of high resistance by leakage method – Discharge of a capacitor through L and R – Condition for discharge to be oscillatory – Frequency of oscillation- LCR series and parallel resonant circuits – Sharpness of resonance – Quality factor – Power in ac circuits – Power factor and its importance.

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 2015 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 : 15 PHP 408

CLASS : II-B.Sc., PHYSICS

Semester – IV

CC VIII – MAJOR PRACTICAL – IV

(For candidates admitted from 2015 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. Temperature co-efficient of resistance of the material of a coil – Potentiometer.
6. Determination of 'H' – Field along the axis of a coil.
7. Percentage of Regulation – Zener Regulated Power Supply.
8. Series Resonance Circuits – LCR.
9. Parallel Resonance Circuits – LCR
10. Temperature co-efficient of resistance of the material of a coil – Post Office Box

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

DEPARTMENT OF PHYSICS

CODE : 15 APCH 303/305

CLASS : II B.Sc., Chemistry

Semester – I

AC - I – ALLIED PHYSICS – I

(For candidates admitted from 2015 onwards)

UNIT – I

Gravitation – Newton’s law – Determination of G by Boy’s method – Centre of gravity – Centre of gravity of solid hemisphere – Moment of Inertia – M.I of solid cone – K.E of rotation – Acceleration of a body rolling down an inclined plane.

UNIT – II

Bending moment – Young’s modulus – Uniform and Non-uniform bending – Rigidity modulus – Couple per unit twist – Torsional pendulum – Surface Tension – Surface tension by Drop weight method – Viscosity – Comparison of viscosities by Burette method.

UNIT – III

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

UNIT – IV

Interference – Air wedge – Diffraction – Plane transmission grating – Normal incidence – Polarization – Optical activity – Specific rotation – Laurent’s half shade polarimeter – Specific rotation of sugar solution.

Spherical and chromatic aberration in lenses – Methods of minimizing spherical and chromatic aberration in lenses.

UNIT – V

Velocity of sound in gases – Newton – Laplace’s formula – Effect of pressure, temperature and humidity on the velocity of sound in gas- Acoustics of buildings – Reverberation – Sabine’s formula only and its importance – Factors affecting audibility.

Ultrasonics – production – Piezo-electric method – Detection – Properties – 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).
5. M.N.Srinivasan – Text book of Sound – Himalaya Publications.

QUESTION PAPER PATTERN (From 2015 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 : 15 APP 304/306

CLASS:II-B.Sc., Chemistry

Semester – III

AC – II -ALLIED PHYSICS PRACTICAL – I

(For candidates admitted from 2015 onwards)

(Minimum 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. Surface tension and Interfacial Tension by Drop weight method.
4. Rigidity modulus of the material of a wire
- Torsional Pendulum.
5. Potentiometer – Calibration of low range voltmeter.
6. Spectrometer – Refractive index of the prism.
7. Figure of merit – Table galvanometer.
8. Meter Bridge – Specific Resistance.
9. Junction diode characteristics.
10. Air wedge- thickness of a thin wire.

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

DEPARTMENT OF PHYSICS

CODE : 15 APCH 405/407

CLASS : II B.Sc., Chemistry

Semester – II

AC – III -ALLIED PHYSICS – II

(For candidates admitted from 2015 onwards)

UNIT – I

Gauss's theorem – Capacitor – Energy of charged capacitor – Loss of energy due to sharing of charges – Capacity of parallel plate capacitor – Kirchoff's laws – Wheatstone's bridge – Carey Foster's bridge – Determination of temperature coefficient of resistance.

UNIT – II

Magnetic induction – Intensity of magnetization – Permeability and susceptibility – Cycle of magnetization – Hysteresis – B-H curve by magnetometer method – Laplace's law – Biot-Savart law – Force on a Straight conductor carrying current - Field along the axis of the circular coil carrying current.

UNIT – III

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 – G.M counter – Nuclear fission and fusion – Thermonuclear reactions.

UNIT – IV

PN junction diode – Forward and Reverse biasing – Characteristics of junction diode – LED – Zener diode – Zener diode as voltage regulator – Transistor – Working – Configuration – CB and CE modes – Transistor biasing – IC fabrications– monolithic diode.

UNIT – V

Number system (conversions for whole numbers) – Binary to Decimal – Decimal to Binary – Hexa Decimal to binary- Decimal to Hexa Decimal– Basic logic gates – using discrete components – Universality of NAND and NOR gates –De-Morgan's theorem – Boolean algebra – simplifications –EX-OR gate – Half adder.

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 2015 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 : 15 APP 406/408

CLASS : II - B.Sc., Chemistry

Semester – IV

AC – IV -ALLIED PHYSICS PRACTICAL – II

(For candidates admitted from 2015 onwards)

(Minimum seven experiments)

1. Co-efficient of viscosity – Burette method - Poiseuille's formula.
2. Thermo-emf by direct deflection method.
3. Young's modulus of the material of a beam - Uniform bending – Pin & Microscope method.
4. Rigidity modulus of the material of a rod - Static Torsion.
5. Potentiometer – Internal resistance of a primary Cell.
6. Basic logic Gates using discrete components.
7. Spectrometer – Refractive index of the Liquid.
8. Newton's rings – Radius of curvature.
9. Carey Foster's bridge – Specific Resistance
10. Zener Diode characteristics.

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

DEPARTMENT OF PHYSICS

CODE : 15NMPH 401

CLASS : II B.Sc., CHEMISTRY

Semester – IV

NMEC I – NON-CONVENTIONAL ENERGY RESOURCES

(For candidates admitted from 2015 onwards)

UNIT – I

Non-conventional energy – Solar energy – Bio-energy – Ocean energy – Wind energy – Geothermal energy – Animal energy – Energy from Industrial and Urban wastes.

UNIT – II

Solar cell – Photovoltaic effect – Performance of solar cell – Performance limitations – Angstrom's Pyroheliometer – Solar Dryer – Solar Cooker – Solar water heater – Solar pond.

UNIT – III

Geothermal energy – Geothermal sources – Uses of Geothermal energy – Hydrothermal convective system – Dry geothermal field power plant – Environmental considerations – Wind energy – Principles of wind energy conversion – Designs of rotor – Site evaluation – Wind turbines – HAWT, VAWT.

UNIT – IV

Biomass – Photosynthesis – Biomass conversion – Gasification of biomass – Methane fermentation – Biogas plants in India – OTEC – Technology – Environmental effects – Tidal energy – Wave energy.

UNIT – V

Introduction to fuel cell – Elements of fuel cell – Types of fuel cells – H₂-O₂ cell – Biochemical cells – Regenerative cells – Hydrogen energy – Hydrogen as alternative fuel.

Books for Study :

1. D.S. Chauhan and S.K. Srivastava – Non-conventional energy resources.

Books for Reference :

1. G.D. Rai – Non-conventional energy sources – Khanna Publishers.
2. G.D. Rai – Solar energy utilization – Khanna Publishers.
3. S.P. Sukhatme – Solar energy.
4. D.P.Kothari, K.C. Singal and Rakesh Ranjan – Renewable energy sources and emerging technologies – Prentice Hall of India Pvt. Ltd., New Delhi.
5. S.A. Abbasi and NAsema-Abbasi – Renewable energy sources and their environmental impact – PHI Learning Pvt. Ltd., New Delhi.

PATTERN OF QUESTION PAPER (*Max. Marks : 75*)

Section- A (**5 x 15 = 75**)

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

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

DEPARTMENT OF PHYSICS

CODE : 15 APC 303

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

Semester – III

AC – V - Allied Physics – I

(For candidates admitted from 2015 onwards)

UNIT – I

Electric field and Potential – Gauss theorem and its Applications – Electric intensity at a point due to a charged sphere, Near an infinite plane charged conductor and At a point between two parallel plane charged conductor – Parallel plate capacitor- Magnetic Induction – Intensity of magnetization – Permeability and susceptibility –Relation between them- properties of Dia, Para and ferro magnetic materials.

UNIT – II

Kirchoff's laws and its application to Wheatstone's network – Carey foster bridge – Principle of potentiometer – Calibration of ammeter and voltmeter (Low range) – Seebeck effect –Variation of thermo emf with temperature – measurement of thermo EMF by direct deflection method – Applications of Thermo electric effect.

UNIT – III

Peak, average and RMS value of AC – Reactance – AC Circuits containing L,C and R – Series and parallel resonance circuits – Impedance – power in AC circuit – Power factor and its importance – Transformer theory with load and without load – Induction Motor.

UNIT – IV

Semiconductors- doping- PN junction diode – Formation of depletion layer – Voltage, Current characteristics – Zener diode – Avalanche breakdown – V-I characteristics – diode testing-Full wave bridge rectifier – working – Ripple factor and efficiency – capacitor and π filters – Diode as switch(DC) – Regulated Power supply using Zener Diode.

UNIT – V

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 oscillator.

Books for Study:

1. Brijlal & Subramanyam – Electricity and Magnetism – Radan Prakashan Mandir.
2. R. Murugesan – Electricity and Magnetism – S. Chand & co.,
3. V. K. Mehta – Principle of Electronics.

Books for Reference:

1. Narayanamurthy – Electricity and Magnetism.
2. D.N.Vasudeva – Fundamentals of Magnetism and Electricity – S. Chand & Co.
3. B. L. Theraja – Basic electronics.

QUESTION PAPER PATTERN (From 2015 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, MAYILADUTHURAL.

DEPARTMENT OF PHYSICS

CODE : 15 APCS 405

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

Semester – IV

AC – VII - Allied Physics – II

(For candidates admitted from 2015 onwards)

UNIT – I

Operational Amplifier – ideal characteristics – inverting and non-inverting amplifier – Adder, Subtractor, Integrator and Differentiator – Comparator – DAC – Binary weighted resistor method – ADC-Successive approximation method.

UNIT – II

Basic Logic gates – truth tables – Logic gates using discrete components- Laws of Boolean algebra-Demorgan's theorem – verification- simplification of Boolean Expression using Boolean laws and K Map (up to four variables only) –Universal gates.

UNIT – III

Fibre optics– structure of optical fibres- classification of fibres- Propagation of Light through an optical fibre- Total internal Reflection -Numerical aperture- Acceptance angle- Fibre Optic communication system-Advantages and disadvantages- Applications.

UNIT – IV

Construction and Working of LED, Photo diode, Phototransistor and Photovoltaic cell- Lasers- characteristics- pumping - population inversion- stimulated emission- Semiconductor Laser- He-Ne Laser- Applications.

UNIT – V

IC- Fabrication - Advantages- classifications- Monolithic IC- Fabrication of IC components-Diode and Transistor-Applications- Modulation and Demodulation-FM receiver.

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 2015 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 : 15 APCSP 304

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

Semester – III

AC – VI - ALLIED PHYSICS PRACTICAL – I

(For candidates admitted from 2015 onwards)

(Minimum seven Experiments)

1. Potentiometer – Calibration of low range voltmeter.
2. Thermo emf – Direct deflection method.
3. Figure of merit – Table galvanometer.
4. Transistor CE characteristics.
5. Zener diode characteristics.
6. Half wave Rectifier
7. Junction diode characteristics.
8. Meter Bridge-specific resistance
9. LCR – Series Resonant Circuit
10. Bridge Rectifier

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

DEPARTMENT OF PHYSICS

CODE : 15 APCSP 406

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

Semester – IV

AC – VIII - ALLIED PHYSICS PRACTICAL – II

(For candidates admitted from 2015 onwards)

(Minimum seven Experiments)

1. Op-amp-Adder
2. Op-Amp Subtractor
3. Op-amp-D/A converter
3. Basic logic gates-Discrete components
4. Carey Foster's Bridge – Specific Resistance
5. Regulated power supply using Zener diode.
6. Voltage doubler
7. RTL gates – NAND and NOR
8. Basic Logic (AND, OR, NOT, NAND and NOR) Gates using ICs
9. LCR – Parallel Resonant Circuit
10. Verification of Demorgan's theorem.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PH 509

CLASS : III B.Sc., PHYSICS

Semester – V

CC IX – OPTICS AND SPECTROSCOPY
(For candidates admitted from 2015 onwards)

UNIT – I

Aberration in lenses – Spherical aberration and methods of reducing it – Coma – Astigmatism – Aplanatic lenses – Chromatic aberration — Condition for achromatism of lenses in contact and separated by finite distance –Distortion- Curvature of field- Primary and Secondary rainbow.

UNIT – II

Principle of superposition – Conditions for interference – Air wedge – Testing the planeness of surfaces – Newton’s Rings – Theory – Determination of refractive index of a lens – Michelson Interferometer – Formation of fringes – Determination and difference in wavelength – Interference filter.

UNIT – III

Fresnel’s diffraction – Rectilinear propagation of light – Zone plate – Fraunhofer diffraction at single and double slits – Plane diffraction Grating – Normal and Oblique incidences – Absent spectra – Overlapping of spectral lines – Dispersive power of a grating – Resolving power of a grating.

UNIT – IV

Polarization – Double refraction – Nicol prism as a polarizer and analyzer – Elliptically and Circularly polarized light – Quarter and Half wave plates – Production and analysis of polarized light – Optical activity – Fresnel’s explanation of rotation – Specific rotatory power - Laurent’s half shade Polarimeter.

UNIT – V

Raman effect – Quantum theory of Raman effect – Experimental verification and applications – IR and UV spectroscopy – Instrumentation and applications – Laser- properties of laser- Induced absorption – Spontaneous emission – Stimulated emission – Pumping - population inversion- – He-Ne Laser – Semiconductor Laser – Applications of lasers.

Books for Study:

1. Subrahmanyam N., Brijlal and M.N. Avadhanulu – A Text book of Optics – S.Chand & Co., New Delhi
2. R.Murugesan and Kiruthiga Sivaprasath – Optics and Spectroscopy – S.Chand & Co., New Delhi (2006).

Books for Reference:

1. Ajay Ghatak – Optics – Tata McGraw-Hill publishing Co. Ltd., New Delhi
2. Gurdeep Chatwal, Sham Anand – Spectroscopy – Himalaya Publishing House.
3. R. Jayaram – Optics and Spectroscopy.
4. Sathyaprakash – Optics and Atomic physics.
5. H.R. Gulati and D.R. Khanna – Fundamentals of Optics.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PH 510

CLASS : III B.Sc., PHYSICS

Semester – V

CC X – ATOMIC AND NUCLEAR PHYSICS

(For candidates admitted from 2015 onwards)

UNIT – I

Cathode rays – Production and Properties – Dunnington’s method for the determination of e/m of an electron – Positive rays – Properties – Aston’s mass spectrograph – Dempster’s mass spectrograph – Critical potential – Methods of excitation – Franck and Hertz’s experiment - Davis and Goucher's method.

UNIT – II

Vector atom model – Quantum numbers – Coupling schemes – Pauli’s exclusion principle – Stern-Gerlach experiment – Fine structure of sodium D lines – Zeeman Effect – Experimental arrangement – Quantum mechanical explanation of normal and anomalous Zeeman Effect. – Paschen-Back effect – Stark effect.

UNIT – III

General properties of nucleus – Size, mass, density, charge, spin angular momentum – Mass defect – Binding energy and packing fraction – Nuclear forces – Theories of nuclear composition – Meson theory of nuclear forces – Liquid drop model – Van Weizacker’s semi empirical mass formula – Shell model.

UNIT – IV

Detectors of nuclear radiation – GM counter – Wilson’s cloud chamber – Nuclear emulsions – Cyclotron – Betatron – Electron and Proton synchrotron – Discovery of neutron – Properties, classification and detection of neutrons – Preparation of radio elements – Application of radio isotopes.

UNIT – V

Elementary particles – Classification – Particles, antiparticles and antimatter
Fundamental interactions – Elementary particle quantum numbers- Conservation laws and symmetry-Quark model – Qualitative studies of Galaxies-Elliptical and Spiral- Neutron star- Birth and death of stars - Black holes.

Books for study:

1. R.Murugesan – Modern physics.
2. N. Subramanian and Brijlal – Atomic and nuclear physics.
3. Hewish. A / Physics of the universe / CSIR publication, New Delhi, 1992.
4. Biman Basu / Inside Stars / CSIR Publication, New Delhi, 1992.
5. Krishnasamy K.S. / Astro Physics a modern perspective / New Age International / New Delhi.

Books for reference:

1. Beisser – Modern Physics.
2. J.B.Rajam – Atomic Physics.
3. S.N. Ghoshal – Atomic and nuclear physics.
4. Kulkarni – Atomic and nuclear physics.
5. C.L. Arora – Atomic and nuclear physics.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PH 511

CLASS : III B.Sc., PHYSICS

Semester – V

CC XI – ANALOG ELECTRONICS

(For candidates admitted from 2015 onwards)

UNIT – I

Bipolar junction transistor configurations- Single stage transistor amplifier – Phase reversal – DC and AC equivalent circuits – Load line analysis – Voltage gain – Multi stage Transistor amplifier – RC , Direct and Transformer coupled amplifiers – Classification of Class B Power Amplifier – Push-Pull power amplifier.

UNIT – II

Barkhausen condition for oscillation – Sinusoidal oscillator – Tank circuit – Frequency of oscillation – Hartley oscillator – Colpitt's oscillator – Phase shift oscillator – Limitations of RC and LC oscillators – Piezo-electric effect – Crystal oscillator.

UNIT – III

Multivibrators – Astable, Monostable and Bistable-Schmitt trigger– Principle and working – Integrated circuit – Classification – Monolithic IC – Fabrication of diode, transistor, resistor and capacitor.

UNIT – IV

FET construction – Characteristics of FET – Common source JFET amplifier – Parameters – Biasing a FET – Self bias – Voltage divider bias – Construction, working and V-I characteristics of SCR and UJT – SCR as a switch – UJT relaxation oscillator.

UNIT – V

Operational Amplifier – Characteristics of an ideal OP-AMP – Inverting amplifier – Scale changer – Adder – Integrator – Differentiator – Non-inverting amplifier – Subtractor – Voltage to Current converter – Current to Voltage converter – Comparator.

BOOKS FOR STUDY:

1. B. L. Theraja – Basic electronics and solid state.
2. V. K. Metha – Principle 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.
4. Sadasiva Biswal – Basic electronics and solid state.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CLASS : III B.Sc., PHYSICS

CODE :15 PHP 512

Semester – V

Hours/Week : 6

Credit :

CC XII – MAJOR PRACTICAL - V

(For candidates admitted during 2015-2016)

(Any TWELVE experiments)

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

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PHE 501

CLASS : III B.Sc., PHYSICS

Semester – V

EC I – ENERGY PHYSICS

(For candidates admitted from 2015 onwards)

UNIT – I

Introduction to energy sources – General – Energy sources and their availability – Commercial energy sources – Coal, Oil, Gas, Water power, Nuclear power, Thermal and Breeder reactor – Non-conventional sources – Solar energy, Wind energy, Bio-mass energy, OTEC, Tidal energy, Geothermal energy, Hydrogen energy.

UNIT – II

Renewable energy sources – Solar energy – Solar constant (Definition) – Solar radiation measurement - Angstrom's Pyrheliometer – Solar air heaters – Solar water heaters – Basic photovoltaic system for power generation – Solar PV arrays – Inverter – Box type Solar cooker.

UNIT – III

Biomass energy – Biomass classification – Bio fuels – Bio gas – Biomass conversion technologies – Thermochemical conversion – Fermentation – Photosynthesis – Biomass gasification – Downdraft gasifier – Biogas plant – Floating drum type biogas plant (KVIC model) – Advantages and disadvantages – Ethanol from biomass – Biodiesel.

UNIT – IV

Geothermal energy – Geothermal field – Geothermal sources – Vapour dominated system – Wind energy – Horizontal axial machine with two blade profile.

UNIT – V

OTEC – Working principle of OTEC – Closed cycle system – Tidal energy – Fuel cells – Design and principle of operation of a fuel cell – Introduction to Hydrogen fuel cell- Advantages and disadvantages – Applications.

Books for Study :

1. G.D. Rai – Non-conventional energy sources – Khanna Publishers.

Books for Reference :

1. G.D. Rai – Solar energy utilization – Khanna Publishers.
2. S.P. Sukhatme – Solar energy.
3. D.S. Chauhan and S.K. Srivastava – Non-conventional energy resources.
4. D.P.Kothari, K.C. Singal and Rakesh Ranjan – Renewable energy sources and emerging technologies – Prentice Hall of India Pvt. Ltd., New Delhi.
5. S.A. Abbasi and NAsema-Abbasi – Renewable energy sources and their environmental impact – PHI Learning Pvt. Ltd., New Delhi.

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

DEPARTMENT OF PHYSICS

CODE : 15NMPH 502

CLASS : III - B.Sc Chemistry

Semester – V

NMEC II – PHYSICS IN EVERYDAY LIFE

(For candidates admitted from 2015 onwards)

UNIT – I

Formation of mushroom shaped cloud after a nuclear bomb explosion – Working of an electric train – 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.

UNIT – II

Cause of death due to electric current – Difference between optical fibres and ordinary cables – Diamond sparkle more than a glass – 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 – Measurement of severity of earthquakes in Richter scale – Consumption of more current during low voltage.

UNIT – IV

Curvely nature of fan wings – Usage of sodium vapour lamp in streets – 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 – Satellite always launched from East coast .

UNIT-V

Significance in the usage of gravels on railway tracks – Reason for not affecting aeroplanes by lightning – Reason for not travelling sound in vaccum – Reason for seeing only one side of the moon always – Reason for not making ornaments with pure gold – Increasing effect of ink flowing when pens are about to run out of ink.

BOOKS FOR STUDY:

1. The Hindu Speaks on Scientific Facts – Volume I & II – The Hindu Publication
2. How things work? – Bright carriers institute, 1525, Nai sarak, Delhi – 110006.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PHE 502

CLASS : III B.Sc., PHYSICS

Semester – V

EC II – COMPUTER PROGRAMMING IN C

(For candidates admitted from 2015 onwards)

UNIT – I

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 Decrement, Conditional, Bitwise, Comma Operators – Arithmetic expressions – Associativity.

UNIT – II

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

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

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

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) Sorting a set of numbers in ascending/ descending order.
- 6) Finding the even/odd numbers in the given set.

Book for Study:

1. E. Balagurusamy – Programming in ‘C’.

Book for Reference:

1. D. Ravichandran – Programming in ‘C’ – New Age International Publishers.
2. V. Rajaraman – Computer programming in ‘C’.
3. Kumar Agarwal – Computer programming in ‘C’.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PH 613

CLASS : III B.Sc., PHYSICS

Semester – VI

CC XIII – THEORETICAL PHYSICS

(For candidates admitted from 2015 onwards)

UNIT – I

Degrees of freedom – Constraints – Generalized Co-ordinates – Transformation equations – Configuration space – Principle of virtual work – D'Alembert's principle – Derivation of Lagrange's equation of motion – Applications of Lagrange's equation – Simple pendulum.

UNIT – II

Generalized momentum – Cyclic or Ignorable Co-ordinates – Lagrangian formulation of conservation theorems – Generalized momentum, energy, linear momentum and angular momentum – Hamiltonian function – Hamilton's equations – Physical significance of Hamiltonian function – Applications of Hamiltonian equations – Simple pendulum, Motion of a particle in a Central force field.

UNIT – III

De Broglie concept of matter waves – De Broglie wavelength – Wave velocity and group velocity for the De Broglie waves – Experimental study of matter waves – Davisson and Germer experiment – G.P.Thomson's experiment for verifying De Broglie relation – Heisenberg's uncertainty principle – Gamma ray microscope.

UNIT – IV

Basic postulates of wave mechanics – Derivation of time dependent and time independent Schrödinger's wave equation – Properties of wave function – Applications of Schrödinger's Wave equation – Particle in a Box – Linear Harmonic Oscillator.

UNIT – V

Distribution of energy in the spectrum of a black body – Planck's Hypothesis – Photoelectric effect – Laws of Photoelectric effect – Einstein's Photoelectric equation – Determination of Planck's constant – Photocells-types and applications- Compton effect – Theory – Experimental verification.

BOOKS FOR STUDY:

1. R. Murugesan – Mechanics and Mathematical Methods.
2. R. Murugesan and Kiruthiga Sivaprasath – Modern Physics.
3. Brijlal and Subramaniam – Atomic and Nuclear Physics.
- 4.

BOOKS FOR REFERENCE:

1. Satyaprakash – Classical Mechanics.
2. Gupta-Kumar-Sharma – Classical Mechanics.
3. Gupta-Kumar-Sharma – Quantum Mechanics.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PH 614

CLASS : III B.Sc., PHYSICS

Semester – VI

CC XIV – MATERIALS SCIENCE

(For candidates admitted from 2015 onwards)

UNIT – I

Introduction to bonds: Ionic bond – Covalent bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogen bond – Free Electron Theory – Expression for electrical conductivity and Thermal conductivity – Wiedemann-Franz law – Classification of solids on the basis of band theory.

UNIT – II

Basis and crystal structure –Types of crystal system – Crystal symmetry - Simple Cubic, Body Centred Cubic, Face Centred Cubic structure, HCP structure - Crystal imperfections: Point defects – Line defects – Surface defects – Volume defects – Burger's Vector.

UNIT – III

Magnetism: Basic definitions –Types of magnetic materials – Dia , Para and Ferro magnetism – Langevin's theory of diamagnetism, Weiss's theory of Ferromagnetism- Superconductivity: Properties of superconducting materials – Meissner effect - Zero resistivity effect of electric and magnetic field - BCS theory – Type I and Type II super conductors - Applications.

UNIT – IV

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

UNIT – V

Metallic glasses-Shape Memory Alloys- Bio materials- properties- preparation and applications- Nano materials- synthesis-Top down: Ball milling - Bottom up approach: Chemical vapour deposition – Characterization: X-ray diffraction and Scherrer method for crystallite size determination.

Books for Study:

1. M.Arumugam – Material Science.
2. M.Arumugam – Engineering Physics.
3. M.S.Ramachandra Rao and Shubra Singh - Nano science and nanotechnology: fundamentals of frontiers.

Books for Reference:

1. V. Rajendran and A. Marikani – Material Science.
2. S.O.Pillai – Solid State Physics.
3. V.Raghavan – Material Science.

DEPARTMENT OF PHYSICS

CODE: 15 PH 615

CLASS: III B.Sc., PHYSICS

Semester – VI

CC XV – DIGITAL ELECTRONICS

(For candidates admitted from 2015 onwards)

UNIT – I

Number systems - decimal, binary, octal and hexadecimal– Inter conversions – BCD code, Excess – 3 code, Gray code – One’s and two’s complements – Simple binary arithmetic operations – Addition, subtraction, multiplication and division – Binary subtraction using one’s and two’s complements.

UNIT – II

Positive and negative logic – Basic and derived logic gates, symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates – Boolean algebra – Basic laws of Boolean algebra – De-Morgan’s theorems – Reducing Boolean expressions using Boolean laws – SOP and POS forms of expressions- minterms and maxterms – Karnaugh map simplification (upto four variables).

UNIT – III

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

UNIT – IV

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 – V

Basic concepts of memory – ROM – PROM – EPROM – EEPROM – RAM – Static RAM – dynamic RAM – D/A converter – R – 2R ladder network & Binary weighted resistor method – A/D converter – Counter type & Successive approximation methods.

Books for study:

1. Albert Paul Malvino – Digital Computer Electronics.
2. R.P. Jain and M.M.S. Anand – Digital Electronics Practice Using Integrated Circuits.
3. B.L. Theraja – Basic Electronics.
4. V.K. Mehta and Rohit Mehta – Principles of Electronics.

Books for reference:

1. Albert Paul Malvino and Donald P. Leach – Digital Principles and Applications.
2. Vijayendran – Introduction to Integrated Electronics.
3. K. Meena – Principles of Digital electronics.
4. Anand Kumar – Fundamentals of Digital circuits.

QUESTION PAPER PATTERN (From 2015 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)

DEPARTMENT OF PHYSICS

CLASS : III B.Sc., PHYSICS

CODE :15 PHP 616

Semester – VI

Hours/Week : 6

Credit :

CC XVI – MAJOR PRACTICAL - VI

(For candidates admitted during 2015-2016)

(Any TWELVE experiments)

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

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

CODE : 15 PHE 603

CLASS : III B.Sc., PHYSICS

Semester – VI

EC III – MICROPROCESSOR

(For candidates admitted from 2015 onwards)

UNIT-I

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-II

Instruction and data format – Opcode and operands – Instruction word size – Addressing modes of 8085 – Intel 8085 Instructions – Data transfer group – Arithmetic group – Logical group – Branch group – Stack, I/O and machine control group.

UNIT-III

Address space partitioning: Memory mapped I/O Scheme – I/O Mapped I/O Scheme – Memory and I/O interfacing: Memory interfacing – I/O interfacing – Data transfer scheme: Programmed data transfer scheme – DMA data transfer scheme.

UNIT-IV

Interrupts of Intel 8085 – Interrupts Call-locations – RST 7.5, 6.5, 5.5, TRAP – Pending interrupts – Interfacing devices (Types only) – Control signals for memory and I/O devices – I/O ports.

UNIT-V

Basis of Assembly Language Program – Algorithm – Flowchart.

Developing assembly language programs for the followings:

- 1) Addition of two 8-Bit numbers.
- 2) Subtraction of two 8-Bit numbers.
- 3) Find One's Complement of an 8-Bit Number.
- 4) Find Two's Complement of an 8-Bit Number.
- 5) To Find the Largest/smallest of the given set of numbers.
- 6) 8-bit Multiplication.
- 7) 8-bit division.
- 8) Decimal to Hexadecimal conversion
- 9) Hexadecimal to Decimal conversion.

BOOK FOR STUDY:

1. B. Ram – Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai Publications.

BOOKS FOR REFERENCE:

1. Gaonkar – Microprocessor Architecture, Programming, and Applications with the 8085/8080A.
2. P.K. Ghosh – Introduction to microprocessor.
3. Albert Paul Malvino – Digital Computer Electronics and Introduction to microprocessor.
4. P. Aditya mathur – Introduction to microprocessor.
5. A. Lance Leventhal – Introduction to microprocessor, software, hardware programming.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305

DEPARTMENT OF PHYSICS

Scheme for the *M.Sc.*, Students

From 2015 – 2016 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 – Bio Medical Instrumentation	4	4	
II	CC V – Solid State Physics	6	5	20
	CC VI – Quantum Mechanics	6	5	
	CC VII – Microprocessor and its Applications	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	
	EDC II – Functional Physics	4	2	
	Elective II – Photonics and Nano Physics	4	4	
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	6	4	
	Project	4	6	
	TOTAL			90

HOD of Physics

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PPH 101

CLASS : I M.Sc., PHYSICS

Semester – I

CC I – CLASSICAL & RELATIVISTIC MECHANICS

(For candidates admitted from 2015 onwards)

UNIT – I:

Mechanics – System of particle – Conservation law – Concept of virtual work – Constraints – Generalized coordinates – D'Alembert's principle and Lagrange's equation – Rules for forming Lagrange's equation – Simple pendulum, Compound pendulum and Atwood's machine – Lagrangian formation of conservation theorems.

UNIT – II:

Phase space – The Hamiltonian function H – Hamilton's equations – Physical significance of the Hamiltonian function - 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.

UNIT – III:

Modified Hamilton's principle – Variational principle – Principle of least action – Deduction of principle of least action – Virial theorem – Generation function and the canonical transformations – Poisson brackets – Properties of Poisson brackets – Lagrange brackets – Properties of Lagrange brackets – Relationship between the brackets – Hamilton-Jacobi method – Action and angle variable.

UNIT – IV:

Rigid body dynamics: Euler angles – Moments and products of Inertia – Euler's equation – Symmetrical top.

Oscillatory motion: Theory of small oscillations – Normal modes and frequencies – Two-coupled harmonic oscillators – Linear tri-atomic molecule.

UNIT –V:

Review of basic ideas of special relativity – Energy momentum four vector – Minkowski's four dimensional space – Lorentz transformation as rotation in Minkowski's space – Compositions of L.T about two orthogonal directions – Thomas precession – 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)

Books for Reference:

1. H. Goldstein - Classical Mechanics, Narosa Book Distributors, New Delhi (1980).
2. N.C. Rana and P.S. Joag - Classical Mechanics, Tata McGraw Hill, New Delhi (1991).
3. Gupta , Kumar , Sharma - Relativistic Mechanics, (Pragathi Prakashan Meerut, 1985)

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PPH 103

CLASS : I M.Sc., PHYSICS

Semester – I

CC III – ADVANCED ELECTRONICS

(For candidates admitted from 2015 onwards)

UNIT – I:

The continuity equation – Application of the continuity equation for an abrupt PN junction diode under forward and reverse bias – Schottky diode – Varactor diode – Tunnel diode – Gunn diode functions and characteristics – Opto electronic devices – LED, LASER diode, photo diode and photo detector.

UNIT – II:

JFET structure and working – I–V characteristics under different conditions – biasing circuits – CS amplifier design – AC load line analysis – MOSFET: Depletion and Enhancement type MOSFET – UJT characteristics – relaxation oscillator – SCR characteristics – application in power control – DIAC, TRIAC.

UNIT – III:

Operational Amplifier characteristics – inverting and non-inverting amplifier – Voltage follower – 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 – IV:

Wien Bridge, phase shift oscillators– triangular, saw tooth and square wave generators – Schmitt’s trigger – sample hold – voltage control oscillator – phase locked loops - Basic D to A conversion: weighted resistor DAC – Binary R-2R ladder DAC – Basic A to D conversion: counter type ADC – successive approximation converter.

UNIT – V:

Reduction of Boolean equations – SOP & POS expressions – Karnaugh map (upto 4 variables) – Don’t care conditions – Design of Synchronous and asynchronous counters (3 bit only) – RS Flip flop – Clocked RS Flip flop – JK Flip flop – Master Slave JK Flip flop – D Flip flop – T Flip flop – Multiplexers (2 : 1 and 4 : 1) – Demultiplexer (1 : 4 and 1 : 8).

Books for Study and Reference:

1. Electronics (classical and modern) KAR, Books and Allied (p) Ltd Kolkata-2007
2. Op-amp and Linear Integrated circuits. R.A.Gaekwad, Prentice Hall, 1999.
3. Digital Electronics, Dr.R.. Sedha-S Chand-New delhi-2010
4. Operational amplifier and linear Integrated circuits, F.Conhlin&F.Driscols-Prentice-Hall of India-New Delhi-2001
5. Fundamentals of Digital Electronics, A.Anandakumar, PHI.
6. Transistor Physics – D.C. Sarkar.
7. Integrated Electronics – Botkar.

8. Digital techniques – V.G. Yangalwar.

PATTERN OF QUESTION PAPER

(Max. Marks : 75)

**Section – A (5 X 5 = 25)
(Answer ALL Questions)**

1. (a) or (b) – Unit - I
2. (a) or (b) – Unit - II
3. (a) or (b) – Unit - III
4. (a) or (b) – Unit - IV
5. (a) or (b) – Unit – V

**Section – B (5 X 10 = 50)
(Answer ALL Questions)**

6. (a) or (b) – Unit - I
7. (a) or (b) – Unit - II
8. (a) or (b) – Unit - III
9. (a) or (b) – Unit - IV
10. (a) or (b) – Unit – V

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PPHP 104

CLASS : I M.Sc., PHYSICS

Semester – I

CC IV – PRACTICAL I

(For candidates admitted from 2015 onwards)

(Any Twelve)

1. UJT – Characteristics and Relaxation oscillator
2. OP – AMP – Solving simultaneous equation
3. OP – AMP – D / A converter (Weighted, Non weighted, R – 2R Ladder network)
4. OP – AMP – Filters (Low, High and Band pass)
5. Shift register – IC 74154
6. OP – AMP – Wein bridge oscillator

7. OP – AMP – Phase shift oscillator
8. OP – AMP – Integrator, Differentiator and Scale changer
9. FET – Amplifier (Single Stage)
10. SCR – Characteristics
11. Half adder and Full adder using NAND and NOR gates only
12. Flip –Flops – SR, D and JK using ICs
13. Power amplifier – Darlington pair amplifier
14. DIAC and TRIAC – Characteristics
15. Monostable multivibrator using transistor.
16. Schmitt Trigger using transistor.
17. 555 Timer – Monostable, Astable and Bistable.

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PPHE 101

CLASS : I M.Sc., PHYSICS

Semester – I

Elective I – BIO-MEDICAL INSTRUMENTATION

(For candidates admitted from 2015 onwards)

UNIT – I:

Cells and their structure – Nature of cancer cells – Transport of ions through the cell membrane – Resting and action potentials – Bio-electric potentials – Nerve tissues and organs – Different systems of human body.

UNIT – II:

Components of the bio-medical instrument system – Electrodes – Electric paste – Micro electrodes – Metal micro electrodes – Depth electrodes – Needle electrode – Surface electrodes – Adhesive tape electrode – Multipoint electrode.

Transducers – Pressure transducers (Variable capacitance, strain gauge) – Temperature measurement (Thermistor type) – Pulse sensor (Photo electric pulse transducer) – Respiration sensors (Strain gauge type chest transducer).

UNIT – III:

Electrocardiography (ECG) – Electroencephalography (EEG) (origin, nature of waveform and recording setup for both) – X-ray computed tomography (CT scanner) – Principle – Scanning components – Magnetic Resonance Imaging (MRI) – Principle – Block diagram of a MRI system.

UNIT – IV:

Pacemaker (ventricular inhibited and atrial synchronous pacemakers) – Artificial heart valves – Defibrillator – Synchronized D.C defibrillator - Model of the Heart-lung machine – Kidney machine.

UNIT – V :

Surgical diathermy – Block diagram of a electrosurgical diathermy unit – Ventilators – Pressure limited ventilator system – Anesthesia machine – Blood flow meter – Laser-Doppler blood flow meter – Gas analyzers – Thermal conductivity Gas analyzer.

Books for Study and Reference:

1. Bio-medical instrumentation – Dr.M.Arumugam, publishers - Anuradha agencies.
2. Bio-medical electronics and instrumentation – Prof.S.K.Venkataram,
Galgotia publications.
3. Medical Instrumentation-Applications and Design-John G.Webster(John Wiley & Sons(Asia Pvt. Ltd)
4. Biomedical Instrumentation and Measurements-Leslie Cromwell,fred J.Wesbel and Pfeiffer(PHI)

PATTERN OF QUESTION PAPER

(Max. Marks : 75)

Section – A (5 X 5 = 25)

(Answer ALL Questions)

1. (a) or (b) – Unit - I
2. (a) or (b) – Unit - II
3. (a) or (b) – Unit - III
4. (a) or (b) – Unit - IV
5. (a) or (b) – Unit – V

Section – B (5 X 10 = 50)

(Answer ALL Questions)

6. (a) or (b) – Unit - I
7. (a) or (b) – Unit - II
8. (a) or (b) – Unit - III
9. (a) or (b) – Unit - IV
10. (a) or (b) – Unit – V

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PPH 205

CLASS : I M.Sc., PHYSICS

Semester – II

CC V – SOLID STATE PHYSICS

(For candidates admitted from 2015 onwards)

UNIT - I:

Crystal classes – 2D, 3D lattices – Bravais lattices – point groups – space groups – Reciprocal lattice – Ewald's sphere construction – Bragg's law – X-Ray Diffraction – Experimental techniques of X – ray diffraction – Laue's method – Powder diffraction – Atomic scattering factor.

UNIT -II:

Cohesion of atoms and cohesive energy – Bonding in solids – Ionic bonding – Bond energy of NaCl molecule – Properties of Ionic solids - Calculation of Lattice energy of Ionic crystals – The Born-Haber cycle – Saturation in covalent Bonds – Properties of Covalent Compounds – Metallic Bond – Properties of Metallic crystals – Inter molecular bonds – Dispersion Bonds – Dipole Bonds – Hydrogen Bonds.

UNIT -III:

Vibration of mono-atomic lattices – Lattices with two atoms per primitive cell – Phonon momentum – Inelastic scattering of neutrons by phonons – Thermal conductivity – Umklapp process – Nearly free electron model – Electron in a periodic potential – Kronig-Penney model – Distinction between metals, insulators and semiconductors.

UNIT -IV:

Quantum theory of paramagnetism – Rare-earth and Iron group ions – Ferromagnetism – Quantum theory – Temperature dependence – Exchange integral – Domain theory – Hysterisis – Antiferromagnetism – Two sublattice model – Ferromagnetism – Ferrites.

UNIT - V:

Macroscopic electric field – Local electric field at an atom Dielectric constant and Polarizability – Classius-Mosotti equation – Ferroelectric domains – Occurrence of superconductivity –Meissner effect – Thermodynamics of superconducting transition – London equation – coherence length – BCS theory - Flux quantization – Type I and Type II superconductors – Josephson superconductor tunneling - DC and AC Josephson effect – SQUID.

Books for Study and Reference:

1. S.O. Pillai, Solid State Physics (New Age International, New Delhi, 1995).
2. Saxena-Gupta- Saxena, Fundamentals of Solid State Physics (Pragati Prakashan – Meerut, 2007).
3. C.Kittel, Introduction to Solid State Physics (Wiley Eastern, New Delhi, 1977)
4. N.W. Ashcrof and N.D. Mermin, Solid State Physics (Holt, Rinehart and Winston Philadelphia).
5. J.S. Blakemore, Solid State Physics (Cambridge University Press, Cambridge, 1974).
6. Raghavan – Material science
7. A.J. Dekker – Solid State Physics

PATTERN OF QUESTION PAPER

(Max. Marks : 75)

Section – A (5 X 5 = 25)

(Answer ALL Questions)

1. (a) or (b) – Unit - I
2. (a) or (b) – Unit - II
3. (a) or (b) – Unit - III
4. (a) or (b) – Unit - IV
5. (a) or (b) – Unit – V

Section – B (5 X 10 = 50)

(Answer ALL Questions)

6. (a) or (b) – Unit - I
7. (a) or (b) – Unit - II
8. (a) or (b) – Unit - III
9. (a) or (b) – Unit - IV
10. (a) or (b) – Unit – V

A.V.C. COLLEGE (AUTONOMOUS)
DEPARTMENT OF PHYSICS

CODE : 15 PPH 206

CLASS : I M.Sc., PHYSICS

Semester – II

CC VI – QUANTUM MECHANICS

(For candidates admitted from 2015 onwards)

UNIT – I:

Schrodinger Equation – Physical meaning and conditions on the wave function – Expectation values and 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 :

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 :

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

Time dependent perturbation theory : Harmonic perturbation – Transition probability.

UNIT - IV :

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

UNIT –V:

Klein-Gordan equation for a free particle and in an electromagnetic field – Dirac equation for a free particle – Charge and current densities – Dirac matrices – Plane wave solution – Negative energy states – Zitterbewegung – Spin angular momentum – Spin-orbit coupling.

Books for Study and Reference:

1. L.Schiff - Quantum mechanics (Tata Mcgraw Hill , New Delhi 1968)
2. P.M.Mathews and K.Venkatesan - A Text Book of Quantum Mechanics (Tata Megraw Hill , New Delhi 1987)
3. V.K.Thankappan - Quantum Mechanics (Wiley –Eastern , New Delhi , 1985)
4. J.Singh - Quantum Mechanics , Fundamentals and application to Technology.(John Wiley , New York ,1997)
5. A.Goswami - Quantum Mechanics (W.C.Brown , Dupuque,1992)
6. Satya prakash Swadi soluja - Quantum Mechanics , (Kadharnath , Ramnath publications)
7. Gupta Kumar Sharma - Quantum Mechanics , (Kadharnath , Ramnath publications)
8. Devanathan – Quantum Mechanics

PATTERN OF QUESTION PAPER

(Max. Marks : 75)

Section – A (5 X 5 = 25)

(Answer ALL Questions)

1. (a) or (b) – Unit - I
2. (a) or (b) – Unit - II
3. (a) or (b) – Unit - III
4. (a) or (b) – Unit - IV
5. (a) or (b) – Unit – V

Section – B (5 X 10 = 50)

(Answer ALL Questions)

6. (a) or (b) – Unit - I
7. (a) or (b) – Unit - II
8. (a) or (b) – Unit - III
9. (a) or (b) – Unit - IV
10. (a) or (b) – Unit – V

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 PPH 207

CLASS : I M.Sc., PHYSICS

Semester – II

CC VII – MICROPROCESSOR AND ITS APPLICATIONS

(For candidates admitted from 2015 onwards)

UNIT – I:

Introduction to Microprocessor – Intel 8085 – Architecture – ALU – Timing and Control unit – Registers – Data and Address bus – Pin configuration – Opcode and Operands – Instruction word size – Instruction cycle – Fetch operation– Execute operation – Machine cycle and state – Instruction and data flow – Timing diagram – Timing diagram for opcode fetch cycle – Memory read – Memory write.

UNIT – II:

Instruction and data formats – Addressing modes – Direct addressing – Register addressing – Register indirect addressing – Immediate addressing – Implicit addressing – Status flags – Intel 8085 instructions – Data transfer group – Arithmetic group – Logical group – Branch group – Stack, I/O and machine control group.

UNIT – III:

Memory mapped I/O scheme – I/O mapped I/O scheme – Memory and I/O interfacing – Memory interfacing – I/O interfacing – Data transfer schemes – Synchronous data transfer – Asynchronous data transfer – Interrupt driven data transfer – Multiple interrupts – Hardware and Software Interrupts.

UNIT – IV:

Programmable Peripheral Interface (PPI) – Architecture of Inter 8255 – Control groups – Control word – 8253 Timer interface – DMA controller – Programmable Peripheral Controller 8259 – Programmable Communication Interface 8251 (USART).

UNIT – V:

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.

Books for study and Reference:

1. Microprocessor Architecture, Programming and Applications with 8085 – Ramesh Gaonkar, 5th Ed.
2. 8085 Architecture and its applications – B.Ram.
3. 8085 Architecture and its applications – K.Vijayendran, Viswanathan Publications.
4. Microprocessor Interfacing – D.V.Hall.
5. Introduction to Microprocessor – Mathur, Adithya .P.

PATTERN OF QUESTION PAPER

(Max. Marks : 75)

**Section – A (5 X 5 = 25)
(Answer ALL Questions)**

1. (a) or (b) – Unit - I
2. (a) or (b) – Unit - II
3. (a) or (b) – Unit - III
4. (a) or (b) – Unit - IV
5. (a) or (b) – Unit – V

**Section – B (5 X 10 = 50)
(Answer ALL Questions)**

6. (a) or (b) – Unit - I
7. (a) or (b) – Unit - II
8. (a) or (b) – Unit - III
9. (a) or (b) – Unit - IV
10. (a) or (b) – Unit – V

DEPARTMENT OF PHYSICS

CODE : 15 PPHP 208

CLASS : I M.Sc., PHYSICS

Semester – II

CC VIII – PRACTICAL II

(For candidates admitted from 2015 onwards)

(Any Twelve)

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

A.V.C. COLLEGE (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CODE : 15 EDPH 201

CLASS : I M.Sc., PHYSICS

Semester – II

EDC I – FACTS ON EVERYDAY PHYSICS

(For candidates admitted from 2015 onwards)

UNIT – I

Formation of mushroom shaped cloud after a nuclear bomb explosion – Humming (Sound) in thermos flasks – Working of an electric train – Clear reception of a transistor when the antenna is touched – 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 – Science behind in swing of a cricket ball – 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 – Difficulty of photograph a TV picture.

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 – Reason for different lengths of rods used to make TV antenna.

BOOKS FOR STUDY:

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

PATTERN OF QUESTION PAPER

(Max. Marks : 75)

Section – A (5 X 5 = 25)

(Answer ALL Questions)

1. (a) or (b) – Unit - I

2. (a) or (b) – Unit - II
3. (a) or (b) – Unit - III
4. (a) or (b) – Unit - IV
5. (a) or (b) – Unit – V

Section – B (5 X 10 = 50)
(Answer ALL Questions)

6. (a) or (b) – Unit - I
7. (a) or (b) – Unit - II
8. (a) or (b) – Unit - III
9. (a) or (b) – Unit - IV
10. (a) or (b) – Unit – V

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

DEPARTMENT OF PHYSICS

CODE : 15 PPH 309

CLASS : II - M.Sc., PHYSICS

Semester – III

CC IX – ELECTROMAGNETIC THEORY

(For candidates admitted from 2015 onwards)

UNIT-I :

Introduction to electrostatics – Dielectric and its polarization – Field inside a uniformly polarized sphere – External field of a dielectric medium – Electric field inside a dielectric.

Boundary value problems in electrostatics: Boundary condition – Image method: Point charge near a infinite ground conducting plane – Green's function method.

UNIT -II:

Current density J – Ampere's law of force – Bio-Savart's law (definition of magnetic induction) - Application – Long straight wire- Ampere's circuital law – Application – B -due to long straight current carrying conductor – Force between two parallel wires – Lorentz force- Magnetic scalar potential – Magnetic vector potential.

UNIT-III:

Equation of continuity – Displacement current – Maxwell's equation- Derivation- particular cases – discussions – Physical significances – 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.

UNIT-IV:

Electromagnetic waves in free space – Propagation of E.M.W in isotropic dielectrics – Propagation of E.M.W in Anisotropic dielectrics – Propagation of E.M.W in ionized gases – The dynamic values of conductivity.

UNIT-V:

Introduction – scattering and scattering parameters – differential scattering cross-section – Total scattering cross section –scattering by a free electron (upto total scattering cross section) - Scattering by a bound electron (upto total scattering cross-section) – state of polarization of scattered radiation – coherence and incoherence in scattered light – Dispersion: Normal and Anomalous – Dispersion in gases.

Books for study and Reference:

1. Electromagnetic theory – Chopra , Agarwal – K.Nath &co meerant-2007
2. Introduction to Electrodynamics - D.Griffiths,prentice hall ,New Delhi -1999.
3. Electromagnetic theory – Sathya Prakash.
4. Electricity and Magnetism – AS. Mahajen, Rangwala.

PATTERN OF QUESTION PAPER (Max. Marks : 75)

Section – A ($10 \times 2 = 20$)

(Answer ALL Questions)

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

Section – B ($5 \times 5 = 25$)

(Answer ALL Questions)

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

Section – C ($3 \times 10 = 30$)

(Answer any THREE Questions)

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

DEPARTMENT OF PHYSICS

CODE :15 PPH 310

CLASS :II M.Sc., PHYSICS

Semester – III

CC X – STATISTICAL MECHANICS

(For candidates admitted from 2015 onwards)

UNIT – I

Energy and First law of thermodynamics – Heat content and heat capacity – Specific heat – Entropy and Second law of thermodynamics – thermodynamic potential and the Reciprocity relations – Maxwell’s relations – Deductions – Properties of thermodynamics relations – Gibb’s-Helmholtz relation – Thermodynamic equilibrium – Nernst heat theorem of Third law – Consequences of third law – Phase – Gibb’s phase rule – Chemical potential.

UNIT – II

Macro and micro states – Statistical equilibrium – Phase space and Ensembles – Micro canonical ensemble, Canonical ensemble and Grand canonical ensemble – Liouville’s theorem – Maxwell-Boltzmann distribution law – Partition function – Relation between partition function and thermodynamic quantities.

UNIT – III

Maxwell Boltzmann law in terms of velocities – derivation of velocities of a gas – 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 – Boltzmann’s entropy relation.

UNIT – IV

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 – V

Bose-Einstein distribution law – Photon gas – Thermal Properties of Bose-Einstein gas – Bose-Einstein condensation – Planck’s radiation formula – Specific heat of solids – Dulong and Petit’s law – Einstein’s theory – Debye’s theory.

Books for study and reference:

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

PATTERN OF QUESTION PAPER

(Max. Marks : 75)

Section – A ($10 \times 2 = 20$)

(Answer ALL Questions)

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

Section – B ($5 \times 5 = 25$)

(Answer ALL Questions)

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

Section – C ($3 \times 10 = 30$)

(Answer any THREE Questions)

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

DEPARTMENT OF PHYSICS

CODE : 15 PPH 311

CLASS : II M.Sc., PHYSICS

Semester – III

CC XI – ATOMIC AND MOLECULAR SPECTROSCOPY

(For candidates admitted from 2015 onwards)

UNIT - I:

Quantum states of electron in atoms – Hydrogen atom spectrum – Electron spin – Stern-Gerlach experiment – Spin-orbit interaction – LS and jj coupling schemes – Fine Structure – Transition rules – Intensity rules – Alkali type spectra – Hyperfine structure – Pauli's exclusion principle – Periodic table.

UNIT - II :

Zeeman effect – Experimental study – Quantum interpretation of normal and anomalous Zeeman effect – Paschen-Back effect – Stark effect.

Born-Oppenheimer approximation – Heitler-London and molecular orbital theories of H₂ molecule and ion – Bonding and Antibonding Molecular orbitals – Application to Butadiene and Benzene.

UNIT - III:

Rotational spectra of diatomic molecules – Rigid rotator – Non rigid rotator – Rotational spectra of polyatomic molecules – Linear, symmetric and asymmetric top molecules – Techniques and Instrumentation.

Vibration of diatomic molecules – Harmonic oscillator – Anharmonic oscillator – Vibrational-Rotational spectra of diatomic molecules – Vibrations of polyatomic molecules – Fundamental vibrations and their symmetry – Analysis of IR techniques and instrumentation.

UNIT - IV:

Raman effect – Quantum theory of Raman effect – Pure Rotational Raman spectra – Vibrational Raman spectra – Vibrational Rotational Raman spectra – Rule of mutual exclusion – Structure determination.

Electronic spectra of diatomic molecule – Frank-Condon principle – Dissociation energy – Dissociation products – Rotational fine structure of electronic-vibrational transition.

UNIT - V:

NMR Spectroscopy – Quantum description of NMR – Chemical shift – Spin-spin coupling – Lattice relaxation times – Coupling constant – Experimental methods – Single coil method – Application.

ESR Spectroscopy – Quantum theory of ESR – Instrumentation – Hyper fine splitting – Determination of ‘g’ value – Deviation of the value of g.

Books for study and Reference:

1. Fundamentals of Molecular spectroscopy – C.N. Ban well
2. Instrumental methods of chemical analysis – H.Kahr – A pragoti edition meerat -2008
3. Spectroscopy – B.K.Sharma –Goel publishing Houn New Delhi -2007
4. Elements of spectroscopy – Gupta kumar Sharma pragathi prakasan publicataion Twentieth edition 2007
5. Molecular structure and Spectrocopy – G. Aruldoss.

PATTERN OF QUESTION PAPER (Max. Marks : 75)

Section – A ($10 \times 2 = 20$)

(Answer ALL Questions)

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

Section – B ($5 \times 5 = 25$)

(Answer ALL Questions)

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

Section – C ($3 \times 10 = 30$)

(Answer any THREE Questions)

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

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

CODE : 15 PPHP 312

CLASS : II M.Sc., PHYSICS

Semester – III

CC XII – PRACTICAL - III

(For candidates admitted from 2015 onwards)

(A) Microprocessor Practical

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 Octal and Hexa systems, Hexa to Decimal systems.
4. Study of 7 – segment display add-on board.
5. Traffic control system using Microprocessor.
6. Control of Stepper motor using Microprocessor.

(B) Digital Electronics Practical

1. Study the function of Multiplexer and Demultiplexer.
2. Study of the function of Decoder and Encoder.
3. Study of Shift register (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. Study of DAC
8. Study of ADC

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

DEPARTMENT OF PHYSICS

CODE : 15 PPHE 302

CLASS : II M.Sc., PHYSICS

Semester – III

Elective II – PHOTONICS AND NANO PHYSICS

(For candidates admitted from 2015 onwards)

UNIT - I

Principle of Lasers – Population inversion – Laser pumping – Quality factor – Threshold condition – He-Ne Laser – CO₂ Laser – Nd-YAG Laser – Injection Laser – Liquid laser – Dye laser – HCL Laser – Holography – Recording and reconstruction of image – Applications of holography.

UNIT - II

Semiconductors: n-type and p-type semiconductors – Conductivity of semiconductors – Carrier concentration - Applications of semiconductors – Photoconductivity - Photoconducting materials – Electronics transitions in photoconductors – Trapping and recombination – General mechanism of photoconductivity – Lifetime of majority carriers.

UNIT - III

Introduction to nanoscience & technology – solid materials and their strength – perspective of length – nanostructures in nature – quantum structures – quantum confinement – surface effects 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 - IV

Properties of nanomaterials: Mechanical, Optical and Electrical properties – Characterisations: Scanning Electron Microscope – Transmission Electron Microscope – Scanning Tunneling Microscope – Atomic Force Microscope - Particle size analyser.

UNIT - V

Quantum dot – Quantum wire – Quantum well – Carbon Nanotubes: Fullerene – Single-walled nanotube – Multi-walled nanotubes – Applications of Nanomaterials: In Medicine – In Energy sector – For water purification – Nanomaterials in communication sector – Nanomaterials for the environment.

Books for study and reference:

1. Laser & Non-linear optics – B.B. Laud, New age international Ltd (Unit –I).
2. Solid state physics – B.S.Sexana, Gupta & P.N.Saxena, Pragati Prakashan Educational Publishers (Unit –II).
3. Principles of Nanoscience & nanotechnology – M.A. Shah & Tokeer Ahmad, Narosa Publishing House (Unit–III,IV & V).
4. Nanotechnology – Mick Wilson, Kamali Kannangara, Geoff Smith & others, Overseas Press (Unit – IV).
5. Nano:The essentials – T. Pradeep, Tata MCGraw Hill Pvt.

PATTERN OF QUESTION PAPER (Max. Marks : 75)

Section – A ($10 \times 2 = 20$)

(Answer ALL Questions)

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

Section – B ($5 \times 5 = 25$)

(Answer ALL Questions)

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

Section – C ($3 \times 10 = 30$)

(Answer any THREE Questions)

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

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

DEPARTMENT OF PHYSICS

CODE : 15 EDPH 302

CLASS : II - PG

Semester – III

EDC – II - FUNCTIONAL PHYSICS

(For candidates admitted from 2015 onwards)

Unit-I

Working of air conditioner – Working principle of an aero plane – Science behind arc welding – Working of an atomic clock – Operation of bio sensors – Working of a Bunsen burner – 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 an emergency light – Function of electronic flash – Principle of fire extinguisher – Working of a hard disk – Working of liquid crystals – Working principle of microphones.

Unit-III

Working of RADAR – Working principle of a periscope – Construction & working of a refrigerator – Function of Zippers – Reason of wheat flour become malleable and elastic – Explanation of fourth dimension – Consumption of low electricity by CFL – Making of Polaroid sun glasses – Difference between air brake and hydraulic – Use of a TV monitor as a computer monitor.

Unit-IV

Difference between mass and weight – Darkening of photo chromatic glass when exposed to sun light – Working of touch screens – Pulling sensation when we stand near a running train – Helicopters hover in the air – Difference between radar and sonar – working of Ham – Techniques behind to pull than to push a lawn roller – superconductivity – More sweating before a heavy rain – Changing the taste of gooseberry after drinking water.

Unit-V

Measurement of speed of a computer – Unconscious when hit on head – Principle behind the breath analyzer used to detect drunken-drivers – Significance of Sriharikota as place for launching rockets – Mellifluous voice nature of the vocal cords of professional singers – No burning of feet to the people walking on burning coal – Reason for rainbow colors on a CD – Working of biological weapon – Translucent nature of paper when smeared with oil or fat – Production of different colors in fireworks.

Books for study

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

Web site: www.brightcareers.com

QUESTION PAPER PATTERN (From 2015 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 : 15 PPH 413

CLASS : II M.Sc., PHYSICS

Semester – IV

CC XIII – NUCLEAR AND PARTICLE PHYSICS

(For candidates admitted from 2015 onwards)

UNIT -I:

Nuclear size, mass - Charge distribution - Spin and parity - Binding energy-Semi empirical mass formula - Nuclear stability - Mass parabola - Nature of nuclear forces-Ground state of deuteron - Magnetic dipole moment of deuteron - proton- neutron scattering at low energies - scattering length , phase shift – Properties of nuclear forces – spin dependence – Charge symmetry – Charge independence – Repulsion at short distances – Exchange of forces – Meson theory.

UNIT -II :

Alpha emission – Geiger-Nuttal law - Gamow theory – Beta emission - Neutrino hypothesis – Fermi theory of beta decay – Selection rules – Nonconservation of parity – Gamma emission – selection rules – Transition probability – Internal conversion – Nuclear isomerism – Interaction of charged particles and X-rays with matter – Basic principles of particle detectors - G.M counters – Solid state detectors – Scintillation and semiconductor detectors.

UNIT - III :

Q-Values and kinematics of nuclear cross sections – Energy and angular dependence – Reciprocity theorem – Breit-Wigner formula – Compound nucleus – Resonance theory – Optical model – Shell model – Liquid drop model – Collective model.

UNIT - IV :

Linear accelerators – Cyclotron – synchrocyclotron – Betatron – Synchrotron – Characteristics of fission – Mass distribution of fragments – Radioactive decay processes – Fission cross section – Energy released in fission – Bohr-Wheeler's theory of nuclear fission – Fission reactors – Thermal reactors – Homogeneous reactors – Heterogeneous reactors – Basic fusion processes – characteristics of fusion – Solar fusion - Controlled fusion reactors.

UNIT - V:

Building blocks of nucleus – Nucleons, leptons, mesons, baryons, hyperons, hadrons, strange particles – Types of Interactions – Basic conservation laws – Additional laws: baryonic, leptonic, strangeness and isospin charges/quantum numbers – Invariance principles and symmetries (CPT theorem) – Eight-fold way and supermultiples – SU(3) symmetry and quark model.

Books for study and 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 (Addison-Wesley,1979)
6. D. Griffiths, Introduction to Elementary Particles (Wiley International, New York, 1987).
7. Nuclear Physics – D. C. Tayal.
8. Nuclear Physics – R. C. Sharma

QUESTION PAPER PATTERN (From 2015 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 : 15 PPH 414

CLASS : II M.Sc., PHYSICS

Semester – III

CC XIV – ANALYTICAL METHODS IN PHYSICS

(For candidates admitted from 2015 onwards)

UNIT - I: Errors and the measurements

General formula for errors – Errors of observation and measurement – Empirical formula – Graphical method – Method of averages – Least square fitting – curve fitting – parabola, exponential.

UNIT - II: Numerical solution of algebraic and transcendental equations

The iteration method – The method of false position – Newton–Raphson method – Convergence and rate of convergence – C program for finding roots using Newton – Raphson method.

Simultaneous linear algebraic equations

Gauss elimination method – Jordon’s modification – Gauss–Seidel method of iteration – C program for solution of linear equations.

UNIT - III: Interpolation

Linear interpolation – Lagrange 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 – C programming for Lagrange’s interpolation.

UNIT - IV: Numerical differentiation and integration

Newton’s forward and backward difference formula to compute derivatives – Numerical integration: Trapezoidal rule, Simpson’s rule – Extended Simpson’s rule – C program to evaluate integrals using Simpson’s and trapezoidal rules.

UNIT - V: Numerical Solutions of ordinary differential equations

N^{th} order ordinary differential equations – Power series approximation – Pointwise method – Solutions 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 – C program for solving ordinary differential equations using RK method.

Books for study and Reference:

1. Introductory Methods of Numerical analysis – S.S. Sastry, Prentice – Hall of India, New Delhi (2003) 3rd Edition.
2. Numerical Methods in Science and Engineering – The National Publishing Co. Madras (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).

PATTERN OF QUESTION PAPER (Max. Marks : 75)

Section – A ($10 \times 2 = 20$)

(Answer ALL Questions)

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

Section – B ($5 \times 5 = 25$)

(Answer ALL Questions)

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

Section – C ($3 \times 10 = 30$)

(Answer any THREE Questions)

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

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

CODE : 15 PPHP 415

CLASS : II M.Sc., PHYSICS

Semester – IV

CC XV – PRACTICAL-IV

(For candidates admitted from 2015 onwards)

*(Minimum of **TEN** experiments)*

1. Determination of Hall coefficient – N type & P type
2. Michelson's Interferometer I – Determination of wavelength & difference in wavelength.
3. Michelson's Interferometer II – Determination of thickness of thin Mica sheet.
4. ALO Band
5. Ultrasonic interferometer – Velocity of light in organic liquid.
6. Quincke's method
7. Guoy's method
8. LASER Experiment I - Determination of particle size & wavelength of light.
9. Four probe method – Energy gap determination
10. Cauchy's constant
11. Charge of electron – Polarizability of a given liquid using spectrometer.
12. Determination of dielectric constant – Using Crystal.
13. Forbe's method – Thermal conductivity per unit length.
14. Rydberg's constant – Solar spectrum.

UNIT – I: New materials

SMART materials – classification – Nanophase materials – Mechanical behavior of materials: Different properties of engineering materials (Elasticity, plasticity, brittleness, hardness, toughness & resilience) – Creep – Factors influencing creep resistance – Diffusion of solids – Applications – Factors affecting mechanical properties (grain size, heat treatment & hardening) – Non-linear optical materials – Applications – Properties.

UNIT – II: Fundamentals of Crystal Growth

The crystalline state – The birth of the concept of crystal growth – Historical review – Importance of crystal growth – classification of crystal growth methods – Generation of reactants – Transport of reactants to the growth surface – Kinetic theory of nucleation – energy of formation of a nucleus – Adsorption at the growth surface – Nucleation – Homogeneous and Heterogeneous nucleation – Nucleation rate.

UNIT – III: Growth from Low Temperature Solutions

Solution – selection of solvents – solubility and super solubility – Saturation and super saturation – Meir's solubility diagram – Metastable zone width – measurement and its enhancement – Growth by (i) restricted evaporation of solvent, (ii) slow cooling of solution and (iii) temperature gradient methods – Growth in Gel media, Electrocrystallization.

UNIT – IV: Growth from Melt

Basis of melt growth – Growth techniques – Bridgman – Stockbarger method – pulling from the melt – Czochralski method - zone refining – vertical, horizontal float zone methods –Skull melting Process - Verueil method.

UNIT – V: Growth from Vapour

Basic principle – physical vapour deposition – Evaporation and Sublimation processes – sputtering – chemical vapour Deposition – Advantages and disadvantages – chemical vapour transport – Fundamentals – Growth by chemical vapour transport Reaction – Transported materials and transporting agents.

Books for study & Reference:

1. Crystal Growth process and methods - Santhananragavan, Ramasamy, KRU publications.
2. Crystal Growth processes - Brice, J. C., Halsted press, John Wiley & sons, New York (1986).
3. Crystal growth from High Temperature solutions - Elwell. D and Scheel. H. J, Academic press, London (1975).
4. Crystal Growth - Buckley, H. E, Chapman and Hall, London(1952).
5. Crystal Growth in Gels - Heinz K. Henisch, Dover publications (1996).

6. Crystallization - Mallin, J. N, Buttermths, London (2004).
7. Hand book of crystal growth, Volume 1, 2 & 3. Edited by D. T. J. Hurle. North Holland – London (1993)
7. Crystal Growth, Morphology and performance - Ichiro Sunagawa, Cambridge University press, (2005).
8. Materials science – M. Arumugam.

PATTERN OF QUESTION PAPER (Max. Marks : 75)

Section – A ($10 \times 2 = 20$)

(Answer ALL Questions)

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

Section – B ($5 \times 5 = 25$)

(Answer ALL Questions)

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

Section – C ($3 \times 10 = 30$)

(Answer any THREE Questions)

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