ALAGAPPA UNIVERSITY, KARAIKUDI
NEW SYLLABUS UNDER CBCS PATTERN (w.e.f.2014-15)

B.Sc., PHYSICS – PROGRAMME STRUCTURE

Sem	Course			Cr.	Hrs./ Week	Marks		Total
	Part	Subject Code	Name			Int.	Ext.	
I	I	411T	**Tamil / Other Languages – I**	3	6	25	75	100
	II	412E	**English - I**	3	6	25	75	100
	III	4BPH1C1	**Core – I** – Properties of matter and Acoustics	4	5	25	75	100
		4BPH1C2	**Core–II**– Mechanics and Relativity	4	5	25	75	100
		---	**Core – III** – General Physics Practical – I	-	2**	--	--	---
			Allied – I (Theory only) (or) **Allied – I (Theory cum Practical)**	5 4	5 3	25 15	75 60	100 75
			Allied General Physics Practical	-	2**	--	--	---
	IV	4NME1A/ 4NME1B/ 4NME1C	**(1) Non-Major Elective – I** – (a)தமிழ் மொழியின் அடிப்படைகள்/ (b) இக்கால இலக்கியம் / (c) Communicative English	2	1	25	75	100
			Total (Allied Theory only)	**21**	**30**	--	--	**600**
			Total (Allied Theory cum Practical)	**20**				**575**
II	I	421T	**Tamil / Other Languages – II**	3	6	25	75	100
	II	422E	**English – II**	3	6	25	75	100
	III	4BPH2P1	**Core – III** – General Physics Practical – I	4	2	40	60	100
		4BPH2C1	**Core – IV** – Thermal and Statistical Physics	4	4	25	75	100
		4BPH2C2	**Core – V** – Electricity, Magnetism and Electromagnetism	4	5	25	75	100
			Allied – II (Theory only) (or) **Allied– II (Theory cum Practical)**	5 4	5 3	25 15	75 60	100 75
			Allied General Physics Practical	2	2	20	30	50
	IV	4BES2	**(3) Environmental Studies**	2	2	25	75	100
			Total (Allied Theory only)	**25**	**30**	--	--	**700**
			Total (Allied Theory cum Practical)	**26**				**725**
III	I	431T	**Tamil /other languages – III**	3	6	25	75	100
	II	432E	**English – III**	3	6	25	75	100
	III	4BPH3C1	**Core–VI–** Optics and Spectroscopy	4	7	25	75	100
		---	**Core – VII** – General Physics Practical – II	-	3**	--	--	---
			Allied – III (Theory only) (or) **Allied–III (Theory cum Practical)**	5 4	5 3	25 15	75 60	100 75
			Allied Electronics Practical	-	2**	--	--	---

	IV	4NME3A/ 4NME3B/ 4NME3C	**(1) Non-major Elective – II** – (a) இலக்கியமும் மொழிப் பயன்பாடும்/ (b) பழந்தமிழ் இலக்கியங்களும் இலக்கிய வரலாறும்/ (c)Effective Employability Skills	2	1	25	75	100
		4SBS3A1/ 4SBS3A2	**(2) Skill Based Subjects – I**	2	2	25	75	100
	V	4BEA3	**Extension activities**	1	--	100	--	100
			Total (Allied Theory only)	**20**	**30**	--	--	**700**
			Total (Allied Theory cum Practical)	**19**				**675**
IV	I	441T	**Tamil / other languages – IV**	3	6	25	75	100
	II	442E	**English – IV**	3	6	25	75	100
	III	4BPH4P1	**Core – VII** – General Physics Practical – II	4	3	40	60	100
		4BPH4C1	**Core – VIII** – Atomic & Nuclear Physics	4	6	25	75	100
			Allied – IV(Theory only) (or)	5	5	25	75	100
			Allied –IV(Theory cum Practical)	4	3	15	60	75
			Allied Electronics Practical	2	2	20	30	50
	IV	4SBS4B1/ 4SBS4B2	**(2) Skill Based Subjects – II**	2	2	25	75	100
		4BVE4/ 4BMY4/ 4BWS4	**(4) Value Education / Manavalakalai Yoga / Women's Studies**	2	2	25	75	100
			Total (Allied Theory only)	**23**	**30**	--	--	**700**
			Total (Allied Theory cum Practical)	**24**				**725**
V	III	4BPH5C1	**Core – IX** – Analog Electronics	4	5	25	75	100
		4BPH5C2	**Core – X** – Computer Programming in C	4	5	25	75	100
		---	**Core – XI** – General Physics Practical III		3**	--	--	--
		---	**Core–XII**- Electronics Practical IV		3**	--	--	--
		4BPHE1A/ 4BPHE1B/ 4BPHE1C	**Elective – I** – Mathematical Physics **(or)** Non-Conventional Energy Sources **(or)** Laser Physics and Fibre Optics	5	5	25	75	100
		4BPHE2A/ 4BPHE2B/ 4BPHE2C	**Elective–II–**Communication Electronics**(or)**Numerical methods and statistics**(or)**Solid State Physics	5	5	25	75	100
	IV	4SBS5A3/ 4SBS5A4/ 4SBS5A5	**(2) Skill Based Subjects – I**	2	2	25	75	100
			(2) Skill Based Subjects – I	2	2	25	75	100
			Total	**22**	**30**	--	--	**600**
VI	III	4BPH6P1	**Core – XI** – General Physics Practical III	4	3	40	60	100
		4BPH6P2	**Core–XII**–Electronics Practical-IV	4	3	40	60	100
		4BPH6C1	**Core – XIII** – Elements of Theoretical Physics	4	6	25	75	100
		4BPH6C2	**Core – XIV** – Digital Electronics	4	5	25	75	100
		4BPH6PR	**Core XV** – Project*	4	4	40	60	100

		4BPHE3A/ 4BPHE3B/ 4BPHE3C	**Elective– III**–Microprocessors **(or)** Computer Programming in C++ **(or)** Fundamentals of Nano Science	5	5	25	75	100
	IV	4SBS6B3/ 4SBS6B4/ 4SBS6B5	**(2) Skill Based Subjects – II**	2	2	25	75	100
			(2) Skill Based Subjects – II	2	2	25	75	100
Total				**29**	**30**	**--**	**--**	**800**
Grand Total				**140**	**180**	**--**	**--**	**4100**

*** Students are advised to visit Industries, academic institutions as part of the educational tour**

**** University Examinations will be held in the Even Semesters.**

I YEAR – I SEMESTER
COURSE CODE: 4BPH1C1

CORE COURSE I – PROPERTIES OF MATTER AND ACOUSTICS

Unit I ELASTICITY

Hooke's Law – Stress – Strain diagram – Elastic Modulii – Work done in deforming a body – Relation between elastic constants – Poisson's Ratio – Expression for Poisson ratio in terms of elastic constants.
Twisting couple on a cylinder – Rigidity modulus by static torsion – Tensional pendulum – determination of rigidity modulus of a wire.

Unit II BENDING OF BEAMS

Expression for bending moment – cantilever – Expression for depression – Experiment to find Young's Modulus – Cantilever oscillations – Expression for period – Experiment to find Young's modulus.
Uniform bending – expression for elevation – experiment to find Young's modulus using microscope – Non – uniform bending – Expression for depression – Experiment to determine Young's modulus using mirror and telescope.

Unit III FLUID MOTION

Surface Tension **–** Definition and dimensions— variation of surface tension with temperature- Determination of surface tension of a liquid by Jaeger's method.
Definition of Viscosity – Coefficient of Viscosity and its dimensions **–**Equation of continuity– Rate of flow of a liquid in a capillary tube – Poiseuille's formula – Experiment to determine coefficient of viscosity of liquid–Variation of viscosity of liquid with temperature– Analogy between liquid flow and current flow.

Unit IV WAVES AND OSCILLATIONS

Simple Harmonic Motion – Free, Damped, Forced Vibrations and Resonance – Intensity and Loudness of sound – decibels – Intensity level – Laws of Transverse Vibrations – Melde's String – Sonometer.
Music and noise – characteristics of musical sound – quality of tone – consonance and dissonance – Musical Scale – Tempered scale – Noise pollution.

Unit V ULTRASONICS

Ultrasonics – Production of ultrasonic wave – Piezoelectric crystal method – Magnetostriction method – Properties – detection – Applications.
Acoustics of buildings **–** Reverberation and time of reverberation – Sabine's Formula – Measurement of reverberation time and Absorption coefficient – Acoustic aspect of halls and auditoria

Books for study

1. Properties of matter – Brijlal and Subramanyam – Eurasia Publishing co., New Delhi, III Edition 1983
2. Element of properties of matter – D.S.Mathur – S.Chand & Company Ltd, New Delhi, 10^{th} Edition 1976
3. A text book of Sound – Subramanyam and Brijlal – Vikas publishing House Pvt. Ltd, II Edition 1982
4. A text book of Sound – Khanna and Bedi Atma Ram & Son's, New Delhi
5. Waves and Oscillations – Subramanyam and Brijlal – Vikas Publishing House Pvt. Ltd, New Delhi, II Edition 2009

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I YEAR – I SEMESTER
COURSE CODE: 4BPH1C2

CORE COURSE II – MECHANICS AND RELATIVITY

Unit I STATICS

Definition Centre of Gravity – solid hemisphere, hollow hemisphere – solid cylinder – tetrahedron – right solid cone.

Friction – Laws of friction – Coefficient of friction – angle of friction – cone of friction – limiting friction – Equilibrium of a body on a rough inclined plane (free and forced) – Friction clutch.

Unit II DYNAMICS AND GRAVITATION

Projectiles **–** Path, Range and time of flight of a projectile and its applications.

Gravitation – Newton's law of gravitation – Kepler's laws of planetary motion – Newton's law from Kepler's law – Boy's method of finding G.

Gravitational potential and intensity due to spherical shell and solid sphere – variation of 'g' due to height, depth and lattitude – escape velocity– motion of a rocket – orbital velocity – geostationary orbit.

Unit III RIGID BODY DYNAMICS

Definition of Moment of Inertia **–** Parallel and perpendicular axis theorems – Angular momentum – Torque – Conservation of linear and angular momentum – Kinetic energy of a rotating body.

Compound pendulum – Centre of gravity and Centre of suspension – Theory of compound pendulum – Determination of g and k – Kater's pendulum.

Unit IV HYDROSTATICS AND HYDRODYNAMICS

Centre of Pressure**:** Definition – Centre of Pressure of rectangular and triangular laminae. Floating bodies**:** Law of floating bodies – Meta centric height – Meta centric height of a ship. Equation of continuity – energy of liquid in motion – Bernoulli's theorem and its applications

Unit V RELATIVITY

Negative result of Michelson Morley experiment – Postulates of special theory of relativity – Galilean and Lorentz transformations.

Length contraction and time dilation – Addition of velocities – Einstein's mass energy equivalence.

Books for Study

1. Naryanamoorthy – Mechanics Part I and II, National Publishing Company
2. D.S.Mathur – Mechanics, S. Chand & Co, I Edition, 2006
3. R.Murugeshan – Mechanics and Mathematical Methods, S.Chand & Co, II Edition, 2005.
4. R.Murugeshan – Modern Physics, S. Chand & Co. (for Relativity),13th Edition, 2008.

Books for Reference

1. P.K.Chakrabarthy–Mechanics and General Properties of Matter,Books and Allied(P)Ltd.
2. D. Halliday, R. Resnick and J. Walker – Fundamentals of Physics, 6th Edition, Wiley, New York 2001.

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I YEAR – I / II SEMESTER
COURSE CODE: 4BPH2P1

CORE COURSE III – GENERAL PHYSICS PRACTICAL - I
(University Examinations will be held at the Second Semester only)

(Any **FIFTEEN** experiments)

1. Uniform bending – Pin and microscope
2. Uniform bending – Optic lever
3. Non – Uniform bending – Pin and microscope
4. Non – Uniform bending – Optic lever
5. q, n, σ – Searle's method
6. Torsion Pendulum – Determination of 'n' and M.I
7. Compound Pendulum
8. Oscillation of cantilever
9. Comparison of Viscosities – Burette
10. Sonometer – frequency of tuning fork
11. Melde's string – two modes
12. Static torsion method – Rigidity modulus
13. Surface tension – Capillary rise
14. Viscosity – Searle's method
15. Sonometer – relative density of a solid
16. Sonometer – verification of the laws of transverse vibrations of a string
17. Bifilar Pendulum
18. Sonometer – AC frequency
19. Surface Tension – Drop weight method
20. Depression of a Cantilever.

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I YEAR – II SEMESTER
COURSE CODE: 4BPH2C1

CORE COURSE IV – THERMAL AND STATISTICAL PHYSICS

Unit I CALORIMETRY

Specific heat capacity of solids – Dulong & Petit's law – specific heat capacity of liquids – method of mixtures.

Specific heat capacity of gases – C_p and C_v – Meyer's relation – C_v by Joly's differential steam calorimeter method – C_p by Regnault's method.

Unit II THERMODYNAMICS

Zeroth and first law of thermodynamics – reversible and irreversible processes – second law of thermodynamics – Carnot's engine – its efficiency.

Entropy – change of entropy in reversible and irreversible processes – temperature – entropy diagrams – third law of thermodynamics – Maxwell's thermodynamic relations.

Unit III LOW TEMPERATURE PHYSICS

Production of Joule Thomson effect – porous plug experiment.

Liquefaction of gases – Properties of Helium I and II – Adiabatic demagnetization – super conductivity Type I and Type II

Unit IV CONDUCTION, CONVECTION & RADIATION

Definition of thermal conductivity – Lee's disc method – convection – lapse rate – Stability of the atmosphere – green house effect – Newton's law of cooling – determination of specific heat capacity of liquid.

Radiation – black body radiation – Wien's law – Rayleigh Jean's law – Planck's law – Stefan's law – pyrometry – solar constant – water flow pyroheliometer

Unit V STATISTICAL METHODS

Phase space – ensembles – micro states and macro states – probability – relation between entropy and probability (qualitative analysis only).

Maxwell Boltzmann distribution law – Bose Einstein statistics and Fermi – Dirac statistics – Comparison of three statistics.

Books for Study

1. Brijlal and Subramanyam – Heat and Thermodynamics, S.Chand & Co, 16th Edition 2005.
2. D.S. Mathur – Heat and Thermodynamics, SultanChand & Sons, 5th Edition 2014.
3. R. Murughesan and Kiruthiga Sivaprasath – Thermal Physics, S.Chand & Co, II Edition 2008

Books for References

1. JB. Rajan – Heat & Thermodynamics
2. Gupta & Kumar – Element of Statistical methods.

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I YEAR – II SEMESTER
COURSE CODE: 4BPH2C2

CORE COURSE V – ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM

Unit I ELECTROSTATICS

Coulomb's inverse square law in electrostatics – Electric field – Gauss law and applications – Coulomb's theorem.

Capacity – Units of Capacity – Capacity of a condenser – capacity of a parallel plate condenser – capacity of a parallel plate capacitor with compound dielectric – capacity of an isolated sphere – capacity of a spherical capacitor – Capacity of a cylindrical capacitor.

Unit II CHEMICAL AND HEATING EFFECTS OF CURRENT

Faraday's law of electrolysis – Electrical conductivity of an electrolyte – Determination of specific conductivity of an electrolyte (Kohlrausch bridge) – Applications of Electrolysis – Gibb's Helmholtz equation for the e.m.f. of reversible cells.

Seebeck, Peltier and Thomson effect – Laws of thermoelectric circuits – Thomson coefficient– Peltier coefficient – Thermoelectric diagrams and their uses – Applications of thermoelectric effect.

Unit III MAGNETIC EFFECTS OF CURRENT

Magnetic induction – Magnetisation – Relation between B, H and M – Magnetic susceptibility – Magnetic Permeability – Magnetic circuit – Magnetic circuit of an electromagnet.

Dia, para, ferro, ferri,antiferro and antiferri magnetism – properties of dia, para and ferro magnetic materials – Langevin's theory of dia and para magnetism – B.H. Curve – Loss of energy due to hysteresis – uses of hysteresis curves.

Unit IV ELECTROMAGNETIC INDUCTION

Faraday's laws of electromagnetic induction – self induction – mutual induction – self inductance of a long solenoid – self inductance and mutual inductance by Rayleigh's method.

Eddy currents – uses of Eddy currents – Charging of a capacitor through L and R – Discharging of a capacitor through L and R.

Unit V ELECTROMAGNETISM

Displacement current – Magnitude of displacement current – Maxwell's equations – Boundary conditions – Equations of an electromagnetic wave – wave equation in one dimension.

Energy of an electromagnetic wave – Poynting theorem and Poynting vector – Hertz experiment for production and detection of electromagnetic waves.

Books for Study

1. Electricity & Magnetism – Brij Lal and N. Subramanyam, Ratan Prakashan Mandir, 18th Edition 1990.
2. Electricity & Magnetism – D.L.Sehgal – L.K.Chopra – N.K.Sehgal,Sultan Chand and Sons, 6th Edition 2014
3. Fundamentals of Magnetism & Electricity – D.N.Vasudeva, S.Chand & Co, 11th Edition 1983.
4. Electricity and Magnetism – K.K.Tewari, S.Chand & Co, II Edition 1990.
5. Electricity and Magnetism – R.Murugeshan, S.Chand & Co, VIIth Edition 2009.

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II YEAR – III SEMESTER
COURSE CODE: 4BPH3C1

CORE COURSE VI – OPTICS AND SPECTROSCOPY

Unit I GEOMETRICAL OPTICS

Lens – Spherical aberration in lenses – Methods of minimizing spherical aberration – chromatic aberration in lenses – condition for achromatism of two thin lenses (in and out of contact) – Coma — Aplanatic lens — Eyepieces – Ramsden's and Huygens's eyepieces.
Dispersion – Angular and Chromatic dispersion – combination of prisms to produce i)dispersion without deviation ii) deviation without dispersion – Cauchy's dispersion formula– Direct vision spectroscope – Constant deviation spectroscope.

Unit II INTERFERENCE

Conditions for interference – colours of thin films – Air wedge – theory – determination of diameter of a thin wire by Air wedge – test for optical flatness – Newton's rings – Determination of refractive index of a liquid.
Michelson's Interferometer – theory and its Application (Measurement of wavelength and difference between wavelength of two close lines, thickness of mica sheet, standardization of meter) – Jamin's and Raleigh's interferometers – determination of refractive index of gases

Unit III DIFFRACTION

Fresnel's diffraction – diffraction at circular aperture – opaque circular disc, Straight edge and narrow wire – Fraunhofer Diffraction at single slit – Double slit – Plane diffraction grating – theory and experiment to determine wavelength – overlapping of spectral lines.
Rayleigh's criterion for resolution – resolving power – resolving power of grating – resolving power of a prism.

Unit IV POLARISATION

Double refraction – Huygens's explanation of double refraction in uni axial crystals – Nicol Prism – Nicol Prism as polarizer and analyzer – Polaroids and their uses – Quarter wave plates and Half wave plates.
Plane, elliptically and circularly polarized light – Production and detection – Optical activity– Fresnel's explanation of optical activity – Specific rotatory power – determination using Laurent's half shade polarimeter.

Unit V SPECTROSCOPY

Microwave and infrared Spectroscopy **–** Rotation of molecules – Rotational Spectra – The rigid diatomic molecules, selection rules – the intensities of spectral lines – techniques and instrumentation (outlines only) Infrared spectroscopy (outlines only) – FTIR (outlines only).
Raman Spectroscopy **–** Quantum theory of Raman effect – Classical theory of Raman effect – Molecular Polarisability – pure rotational Raman spectra of linear molecules – vibrational Raman spectra – Applications – techniques and instrumentations (outlines only).

Books for Study

1. Optics and Spectroscopy	–	R.Murugeshan, S. Chand and co., New Delhi, 6th Edition 2008.
2. A text book of Optics	–	Subramanyam and Brijlal, S. Chand and co.. New Delhi, 22nd Edition 2004.
3. Optics	–	Sathyaprakash, Ratan Prakashan Mandhir, New Delhi, VIIth Edition 1990.
4. Introduction to Molecular Spectroscopy	–	C.N.Banewell, TMH publishing co. New Delhi,IV Edition 2006.
5. Elements of Spectroscopy	–	S.L. Gupta, V.Kumar and R.C.Sharma – Pragati Prakashan, Meerut, 13th Edition 1997
6. Molecular structure and spectroscopy	–	G.Aruldhass, PHI Pvt Ltd, New Delhi, II Edition 2007.

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II YEAR – III / IV SEMESTER
COURSE CODE: 4BPH4P1

CORE COURSE VII – GENERAL PHYSICS PRACTICAL - II
(University Examinations will be held at the end of Fourth Semester only)

(Any **FIFTEEN** experiments)

1. Thermo – emf – Potentiometer
2. Comparison of low resistances – Potentiometer
3. Field along the axis of a coil – Deflection magnetometer
4. Deflection magnetometer – Tan A and Tan B Position
5. Calibration of high range Voltmeter
6. Calibration of ammeter
7. Carrey – Foster Bridge – Temperature Coefficient
8. Thermal conductivity – Lee's disc method
9. Thermal conductivity of rubber
10. Specific heat capacity of liquid – Newton's law of cooling
11. Specific heat capacity of liquid – Joule's Calorimeter
12. Spectrometer – Refractive index of a solid prism
13. Spectrometer – Dispersive power of prism
14. Spectrometer – i – d Curve
15. Spectrometer – i – i ' Curve
16. Hartmann's interpolation formula
17. Grating – Normal incidence
18. Grating – Minimum deviation method
19. Air wedge – thickness of thin wire
20. Newton's ring method – radius of curvature of biconvex lens

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II YEAR – IV SEMESTER
COURSE CODE: 4BPH4C1

CORE COURSE VIII – ATOMIC AND NUCLEAR PHYSICS

Unit I POSITIVE RAYS

Properties of positive rays – e/m of positive rays – Aston's, Bain bridge's mass spectrograph- critical potential – experimental determination of critical potential –Davis and Goucher's experiment.

Photo electricity**:** Photoelectric emission – laws – Lenard's experiment – Richardson and Compton experiment – Einstein's photo electric equation – experimental verification of Einstein's photo electric equation by Millikan's experiment – Photoelectric cells.

Unit II VECTOR ATOM MODEL

Various quantum numbers – L – S and j – j Couplings – Pauli's exclusion principle – electronic configuration of elements and periodic classification – magnetic dipole moment of electron due to orbital and spin motion – Bohr magnetron – spatial quantization – Stern and Gerlach experiment.

Fine structure of spectral lines- Spectral terms and notation – selection rules – intensity rule and interval rule – Fine structure of sodium D lines – Alkali spectra – fine structure of alkali spectra – Spectrum of Helium – Zeeman effect – Larmour's theorem – Debye's explanation of the normal Zeeman effect – Anomalous Zeeman effect .

Unit III X – RAYS

Discovery – Production, Properties and absorption of X – rays – origin & analysis of continuous and characteristic X – ray spectrum – Duane & Hunt Law – Bragg's law – derivation of Bragg's law – Bragg's X–ray spectrometer – details of Laue, rotating crystal and powder methods- Mosley's law and its importance - Compton effect – Derivation of expression for change in wavelength – its experimental verification.

X – ray crystallography- Definition of Crystal **–** Crystal lattice – unit cell — Bravai's lattice – Miller indices – illustrations - Structure of KCl crystals.

Unit IV RADIO ACTIVITY

Natural radioactivity – Laws of disintegration – half life and mean life period – Units of radioactivity – Transient and secular equilibrium – Radio carbon dating – Age of earth – Alpha rays– characteristics – Geiger – Nuttal law – α – ray spectra – Gamow's theory of α – decay (qualitative study) Beta rays – characteristics.

Beta ray spectra – Neutrino hypothesis - Gamma rays and internal conversion– Nuclear isomerism- artificial radioactivity- Betatron – GM counter — Cloud chamber

Unit V NUCLEAR REACTION

Nuclear fission – chain reaction – four factor formula – critical mass and size – controlled chain reaction – nuclear reactor – Breeder reactor – Transuranic elements – Nuclear fusion – thermonuclear reaction – sources of stellar energy- Cosmic rays (outlines only).

Elemantary Particles – Hadrons – leptons – Mesons – Baryons – Hyperons – Antiparticle and antimatter – classification of elementary particles – strangeness – Isospin – conservation laws of symmetry – Basic ideas about quarks – Quark model.

Books for Study

1. Modern Physics	–	R.Murugeshan , S.Chand &Co; NewDelhi, 13th Edition 2008.
2. Modern Physics	–	Sehgal & Chopra; Sultan Chand and publication, 9th Edition 2013.
3. Introduction to Modern Physics	–	H.S Mani, G K Mehta, Affiliated east – West Pvt Ltd, NewDelhi
4. Nuclear Physics	–	D.C Tayal , Himalaya Pub.house, Mumbai, V Edition 2008.
5. Atomic Physics	–	J.B Rajam, S.Chand & Co;NewDelhi.
6. Atomic & Nuclear Physics	–	Subramanyam & Brijal, S.Chand & Co; New Delhi, V Edition 2003.

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III YEAR – V SEMESTER
COURSE CODE: 4BPH5C1

CORE COURSE IX – ANALOG ELECTRONICS

Unit I SEMICONDUCTOR DIODES AND REGULATED POWER SUPPLIES

Semiconductor diode – Crystal diode – Rectifiers – Half and full – Wave rectifiers – Bridge rectifier– Efficiency – Ripple factor – Filter circuits.
Zener diode – characteristics – Voltage regulator – Regulated power supply – Problems.

Unit II TRANSISTORS AND TRANSISTOR BIASING

Transistor action – CB, CE & CC modes – Comparison – Amplifier in CE arrangement – Load line analysis – Cut – off and Saturation – Power rating – Application of CB amplifier.
Transistor biasing – Various methods of transistor biasing: base resistor, feedback resistor, voltage divider methods – Hybrid parameters – Determination of *h* parameters – Analysis of a transistor CE amplifier using *h* parameters.

Unit III AMPLIFIERS – SINGLE STAGE & MULTISTAGE

Single stage amplifier – Phase reversal – DC & AC equivalent circuits – Load line analysis – Voltage gain – Classification of amplifiers – Input impedance of an amplifier.
Multistage transistor amplifier – RC, transformer, direct coupled amplifiers – Comparison of different types of amplifiers.

Unit IV AUDIO AMPLIFIERS AND OSCILLATORS

Transistor audio power amplifier – Difference between voltage and power amplifiers – Performance quantities of power amplifiers – Classification of power amplifiers – Expression for collector efficiency – Class A amplifier – Push – Pull amplifier – Heat sink.
Feedback principle – Negative and positive feedback – Current gain with negative feedback – Emitter follower – DC analysis – Types of oscillations – Undamped oscillations – Colpitt, Hartley, Phaseshift Oscillator.

Unit V OP AMPS

OP AMP: characteristics, OP AMP biasing – Non – inverting & Inverting amplifiers – Applications of OPAMP – adder, subtractor, differentiator, integrator – waveforms study, scale changer and sign changer – Instrumentation amplifier – Voltage level detector.
OP AMP signal generators: Phase shift, Colpitts', Hartley, Square wave and triangular wave generators.

Books for Study

1. V.K.Mehta, Principles of Electronics, S.Chand & Co Ltd.,10^{th} Edition 2007.
2. R.S.Sedha – Text Book of Applied Electronics, S.Chand & Co Ltd., II Edition 2004.

Books for Reference

1. B.L. Theraja – Basic Electronics – S. Chand & Co, V Edition 2009.
2. Malvino & Leach – Transistor Approximations – International Publication – 2000.

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III YEAR – V SEMESTER
COURSE CODE: 4BPH5C2

CORE COURSE X – COMPUTER PROGRAMMING IN C

Unit I C FUNDAMENTALS

The Character set – Identifiers and keywords – Data types – Constants – Variables – Declarations – Expressions – Symbolic constants – Library functions. Operator and Expressions: Arithmetic operators – Unary operators – Relational and Logical operator – Assignment operator – Conditional operator and Bit wise operator.

Data input and output The get char functions – the put char function – Scanf function – Printf function – Gets and puts function.

Unit II CONTROL STATEMENTS

Branching statement: The if and if – else statement – The while statement and the do – while statement.

Looping statement: The for statement – Nested control statement – the switch statement – The break statement – The continue statement – The go to statement.

Unit III FUNCTIONS

Defining a function – Accessing a function – function prototypes – passing Arguments to a function – Recursion.

Program structure Storage classes – Automatic variables – External variables – Static variables.

Unit IV ARRAYS

Defining an array – processing an array – passing arrays to functions – Multidimensional arrays – Arrays and strings

Pointers – Pointer declaration – passing pointers to function – pointers and one dimensional arrays – dynamic memory allocations – operation on pointers – pointers and multidimensional arrays – Arrays of pointers.

Unit V STRUCTURES AND UNIONS

Defining a structure – processing structures – Structures and pointers.

Structures and arrays – self referential structures – Unions

Books for Study

1. Programming in C – Byron Gottfried, TMH Publishing Co., II Edition 1994.
2. Programming in ANSI C – V. Balagurusamy TMH Publishing Co., III Edition 2004.
3. Programming in C – D. Ravichandran, New Age International, I Edition 2002.

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III YEAR – V / VI SEMESTER
COURSE CODE: 4BPH6P1

CORE COURSE XI – GENERAL PHYSICS PRACTICAL - III
(University Examinations will be held at the end of Sixth Semester only)

(Any **FIFTEEN** experiments)

1. Determination of L – Anderson's Bridge
2. Determination of L – Maxwell's Bridge
3. Boltzmann's constant – transistor
4. Band gap of a semiconductor using diode
5. Small angle prism – spectrometer
6. Biprism – Spectrometer
7. Series resonance – LCR bridge
8. Comparison of low and high resistance using spot galvanometer/BG/TG
9. Comparison of mutual inductance – spot galvanometer/BG
10. Absolute determination of mutual inductance – spot galvanometer/BG
11. Comparison of capacitance – spot galvanometer/BG
12. Absolute determination of capacitance – spot galvanometer/BG
13. High resistance leakage – spot galvanometer/BG
14. Parallel resonance – LCR bridge
15. E.C.E of copper – copper voltmeter
16. Figure of merit – spot galvanometer/BG/TG
17. Roots of quadratic equation – C programming
18. Biggest / Smallest number of an array – C programming
19. Multiplication of a matrix – C programming
20. Evaluation of a series – C programming

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III YEAR – V / VI SEMESTER
COURSE CODE: 4BPH6P2

CORE COURSE XII – ELECTRONICS PRACTICAL - IV
(University Examinations will be held at the end of Sixth Semester only)

(Any **FIFTEEN** experiments**)**

1. CE transistor characteristics
2. Zener diode – characteristics – voltage regulator
3. Bridge rectifier
4. Dual power supply (IC)
5. Single stage amplifier
6. Hartley oscillator – Transistor
7. Colpitt's oscillator – Transistor
8. Phase shift oscillator – Op.amp
9. Astable multivibrator using – Op.amp
10. Logic gates using discrete components
11. Verification of De Morgan's Theorem
12. JK flipflop
13. 4 bit binary counter
14. FET characteristics
15. Astable multivibrator using 555 Timer
16. Differentiator and Integrator – Op.amp
17. Adder and subtractor – Op.amp
18. Regulated power supply using IC
19. NAND and NOR as universal gates
20. Logic gates using IC

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III YEAR – V SEMESTER
COURSE CODE: 4BPHE1A

ELECTIVE COURSE I (A) – MATHEMATICAL PHYSICS

Unit I Vector Analysis and Vector Space

Concept of Vector and Scalar fields – Gradient, divergence, curl Linear dependence of vectors – inner product space,

Gauss theorem, Stokes theorem, Greens theorem and Proof, Euler's Equation.

Unit II Fourier Series and integrals

Fourier series for periodic function – Half range series.

Fourier integral theorem – Fourier cosine and sine integrals

Unit III Matrix Theory and Complex Analysis

Solution of linear Algebraic equation – Rank of a matrix – Characteristic equation of matrix – Eigen values and eigen vectors, Caley Hamilton Theorem – Theorem on Eigen Values and Eigen Vectors, Diagonalization of Matrix, Problems

Functions of complex variable – Differentiability – Cauchy – Riemann conditions – complex integration – Cauchy's integral theorem and integral formula.

Unit IV Ordinary and Partial Differentiation

Linear ordinary differential equation – Elementary methods – Linear second order differential equations with constant and variable coefficients.

Methods of forming partial differential equations – solution by direct integration method of separation of variables

Unit V Beta, Gamma functions

Definitions of beta and gamma function – symmetry property of beta function – evaluation of beta function – other forms of beta function – simple problems.

Evaluation of gamma function – value of gamma ½ – other forms of gamma function – Relation between beta and gamma function – simple problems.

Books for study and reference

Relevant chapters in

1. B.D.Gupta – Mathematical Physics – Vikas Publishing House Pvt. Ltd., New Delhi, IVth Edition 2010.
2. Satyaprakash – Mathematical Physics – Sultan Chand and Sons, New Delhi, 6th Edition 2014.
3. A.W.Joshi – Matrices and Tensors in Physics – New Age International Publishers, New Delhi 1995.
4. A.W.Joshi – Elements of Group Theory for Physicist – New age International, New Delhi, IVth Edition 1997.
5. L.A.Pipes and L.R.Harvill – Applied Mathematics for Engineering and Physicist – McGraw Hill, Singapore – 1967.
6. Mechanics and Mathematical methods by R. Murugeshan – S.Chand & Co. Ltd.

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III YEAR – V SEMESTER
COURSE CODE: 4BPHE1B

ELECTIVE COURSE I (B) – NON-CONVENTIONAL ENERGY SOURCES

Unit I INTRODUCTION TO ENERGY SOURCES

Energy consumption as a measure of prosperity – World Energy Future – Energy Sources and their availability – Commercial or conventional energy sources – Non-conventional sources.
Renewable energy sources – Solar energy – Solar constant – Solar radiation at the Earth's surface – Solar radiation geometry – Solar radiation measurements – Solar radiation data.

Unit II SOLAR ENERGY COLLECTION AND STORAGE

Introduction – Physical Principles of the conversion of solar radiation into heat – Flat plate collectors – Concentrating collectors – Focusing type – Advantages and disadvantages of concentrating – Collectors over flat plate collectors.
Solar energy storage and storage systems – Solar pond.

Unit III APPLICATIONS OF SOLAR ENERGY

Introduction – Solar water heating – Space heating – Passive and active heating systems – Solar thermal electric conversion – Solar electric power generation – Solar photo voltaic – Solar cell principles.
A basic photo voltaic system for power generation – Applications of photo voltaic systems – Solar furnace – Solar cooking – Box type solar cooker – Solar green house – Advantages of solar green house.

Unit IV WIND AND GEOTHERMAL ENERGY

Introduction – The nature of the wind – Basic components of a WECS – (Wind Energy Conversion Systems) – Advantages and disadvantages of WECS.
Introduction – Estimation of Geo thermal power – Nature of Geothermal fields – Geothermal sources – Advantages and disadvantages of geothermal energy – Applications of Geothermal energy.

Unit V BIOMASS AND OCEAN ENERGY

Introduction – Photosynthesis – Biogas generation – An aerobic digestion – OTEC – Energy from tides – Basic principles of tidal power – Site requirements.
Storages, advantages and limitations of tidal power generation – ocean waves – Wave energy– Small scale hydro electric systems – Advantages and disadvantages of wave energy conversion.

Book for Study

G.D.Rai – Non-Conventional Sources of Energy, Khanna Publishers, (IV Edn) Unit I: Ch:1 & 2, Unit II: Ch:3 & 4, Unit III: Ch:5, Unit IV: Ch:8 & 7,Unit V: Ch:6 & 9.

Books for Reference

1. G.D.Rai, – Solar Energy Utilization, Khanna Publishers, V Edn 2009.
2. Sukatme – Solar Energy, Tata McGraw Hill Publishing company Ltd., II Edn 1996.
3. H.C.Jain – Non-Conventional Sources of Energy
4. M.P.Agarwal – Solar Energy, S.Chand & Co., I Edn 1983.
5. Janet Ramage – Energy guide book.

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III YEAR – V SEMESTER
COURSE CODE: 4BPHE1C

ELECTIVE COURSE I (C) – LASER PHYSICS AND FIBRE OPTICS

Unit I LASER PHYSICS

Basic principles of LASER – Einstein Coefficients – Condition for light amplification – Population inversion – Threshold condition.

Line shape function – Optical resonators (Qualitative only) – Three level and four level systems.

Unit II LASER TYPE AND OUTPUT MODULATION METHODS

Ruby laser – Nd – YaG Laser – He – Ne laser, CO_2 Laser – Dye Laser – Semi Conductor Laser.

Q Switching and mode locking (qualitative) – Experimental methods.

Unit III LASER APPLICATIONS

Application of laser in industry – Cutting – Welding – Drilling – Surface hardening – Medical applications – Laser as diagnostic & therapeutic tool.

Holography – Theory of recording and reconstruction – Applications of holography – Holographic interferometry in non destructive testing, Acoustic holography and Holographic microscopy – Lasers in compact disc players.

Unit IV OPTIC FIBRES

Basic structure of an Optic fibre – Acceptance angle – Numerical aperture – Propagation of light through an optical fibre – Theory of modes formation.

Classification of fibres – Step index & graded index fibres – Comparison of the two types – Single mode & multimode fibres – Losses in fibres – Dispersion in fibres – Fabrication of fibres.

Unit V FIBRE OPTIC COMMUNICATION

Optical communication – Advantages – Light sources – Modulation methods – Photo detectors – Optical couplers – Splicing.

Communication systems (Block diagram) – Repeaters – Fibre cables – Measurements of numerical aperture & optical time domain reflectometers.

Books for Study

1. K.Thyagarajan,A.K.Ghatak–Laser theory and applications,Macmillan India Ltd.,I Edn,1999
2. Avadhanulu M.N. – An introduction to lasers, theory & applications, S.Chand & Co, New Delhi, I Edn, 2001.
3. Subir Kumar Sarkar – Optical fibres & Fibre optic communication systems, S.Chand & Co., New Delhi, IV Edn, 2010.
4. R.K.Gaur & S.L.Gupta (eighth edition) – Engineering Physics, Dhanat Rai Publications, New Delhi, VII Edn, 1998.
5. P.K.Palanisamy – Physics for Engineering, Scitech Publications private Ltd.

Books for Reference

1. Ajoy Ghatak & K.Thygarajan–Introduction to Fibre Optics, Cambridge University Press.
2. P.K.Palanisamy – Solid State Physics, Scitech Publication (India) Private Ltd.

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III YEAR – V SEMESTER
COURSE CODE: 4BPHE2A

ELECTIVE COURSE II (A) – COMMUNICATION ELECTRONICS

Unit I MODULATION

Amplitude modulation – definition – power in AM wave – Block diagram of an AM transmitter – collector modulation – Double side band modulator – single side band suppressed carrier – vestigial side band system.

Frequency modulation – FM spectrum – varactor diode FM modulator – Pulse modulation – pulse Amplitude modulation, pulse width modulation.

Unit II DEMODULATION

AM detector – diode detector VSB demodulator – block diagram of superhetrodyne receiver– phase locked loop.

FM discriminator – Ratio detector – demodulation of PM – Noise in Amplitude Modulation, Frequency Modulation, Phase modulation.

Unit III DIGITAL COMMUNICATION

Digital modulation schemes – Amplitude Shift Keying, Frequency Shift Keying.

Digital Communication – Advantages and disadvantages of digital communication.

Unit IV BROAD BAND AND SATELLITE COMMUNICATION

Time division multiplexing – frequency division multiplexing – computer communication – ISDN – LAN – star topology, ring topology and hybrid topology.

PBX – modems – Basic components of satellite communication – uplink and downlink.

Unit V FIBRE OPTIC COMMUNICATION

Basic fibre optic system – Advantages of fibre optic system – propagation of light through fibre.

Fibre Optic Communication – Numerical aperture – loss & distortion.

Books for Study

1. George Kennedy – Electronic communication system, TMH Pub Co, IV Edn, 1999.
2. GK. Mithal – Fundamentals of Electronic & Radio, Khanna Publishers.
3. Roddy & Coolon – Electronic Communication, PHJ Ltd., IV Edn, 1998.

Books for References

1. ML. Gupta – Electronic & Radio Engineering
2. Arangarajan – Communication system
3. Taub & Schilling – Principle of Communication system, TMH Publishers., I Edn, 1999.

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III YEAR – V SEMESTER
COURSE CODE: 4BPHE2B

ELECTIVE COURSE II (B) – NUMERICAL METHODS AND STATISTICS

Unit I

Algebraic & Transcendental equations: Bisection Method, Newton Raphson Method, Iteration method – Finite differences.

Forward, Backward differences – Newton's forward & backward difference interpolation formulae. Lagrange's interpolating polynomial.

Unit II

Numerical differentiation – Numerical Integration using Trapezoidal rule and Simpson's first & second rules (proof not needed).

Solutions to Linear Systems – Gaussian Elimination Method – Jacobi & Gauss Siedal iterative methods – Theory and problems

Unit III

Numerical solution of ODE: Solution by Taylor Series Method, Euler's Method, Runge – Kutta 2nd order method.

Adam's Predictor Corrector Method and Milne's Predictor Corrector Methods

Unit IV

Mean, Median, Mode, Standard Deviation – Expectation –Variance and covariance.

Correlation and Regression – Properties of Simple Correlation and regression coefficients – Simple Numerical Problems only.

Unit V

Distributions: Discrete & Continuous distributions: Binomial, Poisson, Normal distributions.

Properties of normal distributions – Relation between Binomial, Poisson, Normal distributions

Text Book(s)

1. S.S.Sastry, Numerical Analysis (Unit 1, 2, 3)
2. Gupta.S.C & Kapoor,V.K, Fundamentals of Mathematical Statistics, Sultan Chand & sons, New Delhi – 1994. (Units 4 & 5)

Reference(s)

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited, 1999.
2. C.E. Froberg, Introduction to Numerical Analysis, II Edn., Addison Wesley, 1979.

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III YEAR – V SEMESTER
COURSE CODE: 4BPHE2C

ELECTIVE COURSE II (C) – SOLID STATE PHYSICS

Unit I BONDS IN SOLIDS

Force between atoms – cohesive energy – ionic bond – expression for the cohesive energy of an ionic crystal – Madelung constant.
The Born-Heber cycle – covalent bond – metallic bond – molecular bond – hydrogen bond.

Unit II SUPER CONDUCTIVITY

Distinction between conductors and insulators (Bond theory) – Critical temperature – properties of super conductors – Meissner effect – BCS theory.
Josephson effect – Applications of high temperature super conductors – super conducting magnets

Unit III CONDUCTION AND DIELECTRIC MATERIALS

Physical properties of metals – classification – free electron theory – Weidmann – franz's law– dielectric parameter – types of polarization – types of dielectric materials.
Clausius-Mossotti equation – application of dielectric materials.

Unit IV SEMICONDUCTORS

Properties of semiconductors – types of semiconductors – effects of electric field on N–type and P–type semiconductors – conductivity in a semiconductor.
The Hall Effect – experimental determination of Hall voltage, carrier concentration and mobility – application of Hall Effect.

Unit V SEMICONDUCTOR DEVICES

Photo conductivity – applications – Photo conductive cells – Photo diode – Avalanche photo diode Thermistors.
Photo Voltaic effect – Solar cell working – Luminescence in Semi conductors applications

Book for Study

1. Material Science and Engineering – V.Raghavan 4th Edition –PHI publications
2. Material Science–M.Arumugam–Arunradha publications. Kumbakonam,III Edn, 2010.
3. Electric Engineering Materials – Dekker 1st Edition – Prentice hall publications.
4. Science of Engineering materials – C.M.Srivastava, C.Srinivasan – 2nd Edition – New age international publications.

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III YEAR – VI SEMESTER
COURSE CODE: 4BPH6C1

CORE COURSE XIII – ELEMENTS OF THEORETICAL PHYSICS

Unit I LAGRANGIAN MECHANICS

Mechanics of a system of particles – Constraints – Types of constraints – Generalized coordinates.

Principle of virtual work – D'Alembert's principle – Lagrange's equation from D'Alembert's principle – Applications: Atwood's machine.

Unit II OLD QUANTUM THEORY

Inadequacy of classical mechanics – Planck's hypothesis – Dual nature of matter – Matter waves – De Brogile's hypothesis and relation – Experimental evidence for matter waves – Davisson and Germer Experiment.

Canonically conjugate variables – Heisenberg's Uncertainty principle – Illustration of uncertainty principle.

Unit III SCHRODINGER'S WAVE MECHANICS

Wave function – Physical significance – Admissibility and boundary conditions – Normalized and orthogonal wave functions – Eigen values – Eigen functions.

Schrödinger time dependent wave equation – time independent from time dependent equation– stationary states.

Unit IV APPLICATIONS OF SCHRODINGER EQUATION

Postulates of Quantum Mechanics – Eigen value equation – Hamiltonian operator – Commutation relations between operators – Dynamical variables as operators – Hermitian operators.

Eigen values and Eigen functions of Particle in a box, Potential well, Potential Barrier and Harmonic oscillator problems – Zero point energy – Significance

Unit V OPERATOR ALGEBRA

Hilbert space – Dirac's notation – state vector – ladder operators – Eigen values and Eigen functions of harmonic oscillator using operator algebra.

Angular momentum operators – commutation relations between L^2, L_x, L_y, L_z, L_+ and L_-.

Books for Study

1. R. Murugeshan, Modern Physics, S. Chand & Co., 13th 3rd Edition, 2008.
2. P.M. Mathews and A. Venkatesan, Textbook of Quantum Mechanics, TMH, II Edition, 2010.
3. Rana and Joag, Classical Mechanics, TMH Publishing Company., I Edn, 1997.

Books for Reference

1. H. Goldstein, Classical Mechanics, 2nd edition, Naroasa
2. L.I. Schiff, Quantum Mechanics

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III YEAR – VI SEMESTER
COURSE CODE: 4BPH6C2
CORE COURSE XIV – DIGITAL ELECTRONICS

Unit I DIGITAL FUNDAMENTALS

Codes and Number Systems – Decimal, Binary, Octal and Hexadecimal number systems – Inter conversions – 8421 BCD code – Other 4 bit BCD codes – Excess 3 code – Gray code.
Basic LOGIC Gates – AND, OR, NOT, NAND, EX-OR functions – their Truth tables. NAND & NOR as Universal gates – De Morgan's theorem – Associative law, Commutative law – Distributive law.

Unit II COMBINATIONAL LOGIC

Binary Arithmetic Circuits – Half Adder – Full Adder– 8421 BCD Adder – Half Subtractor – Full Subtractor - Boolean Algebra – Boolean theorems.
Simplification of Boolean functions – Algebraic simplification – AND-OR logic – NAND-NAND net work – OR – AND logic – NOR-NOR network – Sum of Products & Product of Sums – Karnaugh mapping of Two, Three, Four variables – Don't care conditions

Unit III SEQUENTIAL LOGIC

Flip-Flop – R-S Flip-Flop – Clocked R-S Flip-Flop – D Flip-Flop- J-K Flip-Flop – Triggering of Flip-Flop – Master Slave Flip-Flop.
Registers & Counters – Registers – Shift Registers – Shift Right, Shift Left Registers – Counters – Ring counter – Johnson's ring counter – Asynchronous (Ripple) Counter – Different modulii Counters – up counter – down counter – Synchronous Counter – Different modulli Counters.

Unit IV D/A AND A/D CONVERTERS

Introduction – Variable resistor network – Binary ladder – D/A Converter – D/A accuracy and resolution – A/D converter.
Simultaneous conversion – Counter method – Successive approximation – A/D – A/D accuracy and resolution.

Unit V MEMORY CIRCUITS AND SYSTEMS

Programming bipolar PROMS – MOS static RAM cell – MOS dynamic RAM cell – Refreshing circuits – Charged Coupled devices – Basic CCD operations.
Magnetic bubble memory – Auxiliary memory storage – Magnetic disk, floppy disk and Winchester hard disk – CD – Laser R/W systems – Flash Memory (memory stick).

Books for Study

1. Millman and Halkias, Integrated Electronics, International Ed., McGraw Book Co., New Delhi, 1972.
2. Malvino and Leach, Digital Principles and Application, 4th Ed., Tata McGraw Hill, New Delhi, VI Edn, 2008.
3. Anokh Singh and A.K. Chhabra, Fundamentals of Digital Electronics and Microprocessors, S.Chand and Co Ltd, New Delhi, II Edn, 2005.
4. A. Subramanyam – Applied Electronics – NPC – 2005

Books for Reference

1. Virendra Kumar – Digital Technology Principle and Practice – New Age International Pvt. Ltd. – 2005.
2. Floyd – UBS – 2005 – Digital Fundamentals.
3. Samuel.C.Lee–Digital Circuits and Logic Design–Prentice Hall of India Pvt.Ltd–2005

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III YEAR – VI SEMESTER
COURSE CODE: 4BPHE3A

ELECTIVE COURSE III (A) – MICROPROCESSORS

Unit I INTRODUCTION

Introduction to computer architecture and organization: instruction set and addressing – CPU organization.

Overview of machine language and assembly language programming – overview assemblers, compilers, editors, debuggers etc.

Unit II ARCHITECTURE

Introduction to 8 bit microprocessor: Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organisation.

Functional details of pins, Control signals, Concept of multiplexing, Demultiplexing, Interrupt features, Serial communication feature, DMA support

Unit III PROGRAMMING

Assembly Language Programming: 8085 instruction set: Instructions, Classifications, Addressing modes – Stack Pointer and stack organization.

Programming examples (Arithmetic fns, BCD fns, Sorting, Bit/ String Manipulations, Subroutines (use of stack), Interrupt related and I/O related) – I/O mapped I/O, and memory mapped I/O techniques.

Unit IV TIMING AND INTERRUPTS

Instruction Timing and Interrupts: Timing Diagrams (of various instructions): T-state, Machine cycle (Opcode fetch, Read / Write, Interrupt Acknowledge, Bus Idle, etc), Instruction cycle. Programming examples dealing with delay routines, counters etc.

Interrupts: types (h/w and s/w), Maskable / Non maskable, their organization, timing, branch address – priority, Polling.

Unit V INTERFACING

Interfacing concepts and devices: Memory interface: Concept of memory chip/ chips interface to MuP (8085) with appropriate examples.

Programmable interfacing devices: Programmable peripheral interface (Intel 8251) – architecture,register organization,initialization,hardware and software interface to MuP(8085)

Books for Study

1. Goankar,"Microprocessors Architecture Programming and Applications", Penram Int. Publisher, V Edn, 1999.
2. Hamacher C V, "Computer Organisation – Mc.Graw Hill, New York, 3rd Edition 1990.

Books for References

1. Pal Chaudhary P,"Computer Organisation and Design",Prentice Hall,New Delhi, 1995.
2. Bartee T C, "Digital Computer Fundamentals", Mc.Graw Hill, New York, 1977
3. Hayes J P, "Computer Organisation and Architecture – 2nd Edition", Mc Graw Hill, New York.
4. Tanenbaum A S, "Structured Computer Organisation – 3rd Edition", Prentice Hall, New Jersey.
5. Douglas V Hall, "Microprocessors & Interfacing to 8085 Introduction to", Tata Mc GrawHill Publishin Co.
6. Ghose Sridhar, "Microprocessors for Engineers and Scientists"
7. Lance A Leventhal, "Introduction to Microprocessors" Prentice Hall

III YEAR – VI SEMESTER
COURSE CODE: 4BPHE3B

ELECTIVE COURSE III (B) – COMPUTER PROGRAMMING IN C++

Unit I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING

Procedure oriented and object oriented programming – principles of object oriented programming – Basic concept of object oriented programming.
Benefits of object oriented programming – Applications of object oriented programming – structure of a C++ program.

Unit II INTRODUCTION TO C++

Tokens – keywords – identifiers and constants – basic data types – variable declaration – operators – manipulators – expressions – control structures.
Functions – function prototyping– call by reference – return by reference – inline functions – default arguments.

Unit III CLASSES AND OBJECTS

Specifying a class – defining a member function – constructors and destructors.
Parameterized constructor – copy constructor – dynamic constructor – destructor.

Unit IV POLYMORPHISM

Operator overloading – function overloading – overloading unary and binary operators. Virtual functions – inheritance – single inheritance, multiple inheritance and multilevel inheritance – hybrid inheritance.

Unit V WORKING WITH FILES

Classes for file stream operations – opening and closing a file.
Text file operations – binary file operations – error handling during file operations.

Books for Study

1. E. Balagurusamy – Object Oriented Programming with C++, TMH Pub. Co.Ltd., II Edn,, 2007.
2. Robert Lafore – Object Oriented Programming in C++

Books for References

1. Bjarne Stroutstrup – The C++ programming language
2. Lippmann – C++ primer.

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III YEAR – VI SEMESTER
COURSE CODE: 4BPHE3C

ELECTIVE COURSE III (C) – FUNDAMENTALS OF NANOSCIENCE

Unit I Introduction

Introduction to Nanotechnology – Background and definition of Nanotechnology – Nano materials – Size Dependence.
Types: Nanowires, Nanotubes, Quantum Dots, Nanocomposites – Properties – Ideas about Nano materials synthesis.

Unit II Carbon Nano Tubes (CNT)

Introduction to CNT – SWNT – MWNT – Properties.
CNT based Nano objects- Applications.

Unit III Fabrication

Fabrication methods – Top down processes – Milling, lithographics, Machining process. Bottom–Up process – MBE and MOVPE, liquid phase methods, colloidal and sol – gel methods – Self Assembly

Unit IV Characterization

Scanning Probe Microscopy – Principle of operation – Instrumentation – Scanning Tunneling Microscopy – STM probe construction and measurement.
Atomic Force Microscopy – Instrumentation and Analysis – Tunneling Electron Microscopy– operation and measurement

Unit V Nano devices and Applications

Optical memories, Nano materials applications in magnetism – in electronics. Sensors – in Biomedical field – in optics – Nano layer applications – Nano particle applications

Reference

1. Hand book of Nanotechnology – Bharat Bhushan.
2. Nano technology and Nano electronics – W. R. Fahrner (Editor).
3. Materials Science – P. Mani, G. Ranganath, R. N. Jayaprakash.
4. Nanotechnology – Mark Ratner, Daniel Ratner.

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QUESTION PAPER PATTERN

	Core Papers(Theory)	Allied Papers(Theory)
	Part A	
Ten short answer type questions (two questions from each unit)	10×2=20marks	10×1=10marks
	Part B	
Five questions (either or type) One question from each unit	5×5=25marks	5×4=20marks
	Part C	
Three questions out of five One question from each unit	3×10=30marks	3×10=30marks

Note: In part B any two questions , either (a) or (b) may be problems