ALAGAPPA UNIVERSITY, KARAIKUDI
NEW SYLLABUS UNDER CBCS PATTERN (w.e.f.2017-18)

B.Sc. PHYSICS – PROGRAMME STRUCTURE

Sem.	Part	Course Code	Title of the Course	Cr.	Hrs./ Week	Marks		Total
						Int.	Ext.	
I	I	711T	**Tamil / Other Languages – I**	3	6	25	75	100
	II	712E	**English – I**	3	6	25	75	100
	III	7BPH1C1	**Core – I** – Properties of matter and Sound	4	5	25	75	100
		7BPH1C2	**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 Practical – I	-	2**	--	--	---
	IV	7NME1A/ 7NME1B/ 7NME1C	**(1) Non-Major Elective – I** (**A**) தமிழ்மொழியின் 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	721T	**Tamil / Other Languages – II**	3	6	25	75	100
	II	722E	**English – II**	3	6	25	75	100
	III	7BPH2P1	**Core – III** – General Physics Practical – I	4	2	**40**	**60**	100
		7BPH2C1	**Core – IV** – Thermal and Statistical Physics	4	4	25	75	100
		7BPH2C2	**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 Practical – I	2	2	20	30	50
	IV	7BES2	**Environmental Studies**	2	2	25	75	100
			Total (Allied Theory only)	**25**	**30**	--	--	**700**
			Total (Allied Theory cum Practical)	**26**				**725**
III	I	731T	**Tamil /Other Languages – III**	3	6	25	75	100
	II	732E	**English – III**	3	6	25	75	100
	III	7BPH3C1	**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 Practical – II	-	2**	--	--	---

	IV	7NME3A/ 7NME3B/ 7NME3C	**(1) Non-major Elective – II** (A)இலக்கியமும் மொழிப் பயன்பாடும்/ (B) பழந்தமிழ் இலக்கியங்களும்இலக்கியவரலாறும் /(C) Employability Skills	2	1	25	75	100
		7SBS3A1/ 7SBS3A2/ 7SBS3A3	**Skill Based Subjects – I**	2	2	25	75	100
	V	7BEA3	**Extension activities**	1	--	100	--	100
			Total (Allied Theory only)	**20**	**30**	--	--	**700**
			Total (Allied Theory cum Practical)	**19**				**675**
IV	I	741T	**Tamil / other languages – IV**	3	6	25	75	100
	II	742E	**English – IV**	3	6	25	75	100
	III	7BPH4P1	**Core – VII** – General Physics Practical – II	4	3	**40**	**60**	100
		7BPH4C1	**Core – VIII** – Atomic & Nuclear Physics	4	6	25	75	100
			Allied – IV(Theory only) **(or)** **Allied –IV**(Theory cum Practical)	5 4	5 3	25 15	75 60	100 75
			Allied Practical - II	2	2	20	30	50
	IV	7SBS4B1/ 7SBS4B2/ 7SBS4B3	**Skill Based Subjects – II**	2	2	25	75	100
		7BVE4/ 7BMY4/ 7BWS4	**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	7BPH5C1	**Core – IX** – Analog Electronics	4	5	25	75	100
		7BPH5C2	**Core–X**–Computer Programming in C	4	5	25	75	100
		---	**Core–XI**– General Physics Practical III		3**	--	--	--
		---	**Core–XII**- Electronics Practical IV		3**	--	--	--
		7BPHE1A/ 7BPHE1B/ 7BPHE1C	**Elective–I**–**A)** Mathematical Physics **(or) B)** Non-Conventional Energy Sources **(or) C)** Laser Physics and Fibre Optics	5	5	25	75	100
		7BPHE2A/ 7BPHE2B/ 7BPHE2C	**Elective–II– A)**Communication Electronics **(or)** **B)**Numerical methods and statistics **(or) C)** Solid State Physics	5	5	25	75	100
	IV	7SBS5A4/ 7SBS5A5/ 7SBS5A6/ 7SBS5A7	**(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	7BPH6P1	**Core – XI** – General Physics Practical III	4	3	**40**	**60**	100

		7BPH6P2	**Core–XII**–Electronics Practical-IV	4	3	**40**	**60**	100
		7BPH6C1	**Core – XIII** – Elements of Theoretical Physics	4	6	25	75	100
		7BPH6C2	**Core – XIV** – Digital Electronics	4	5	25	75	100
		7BPH6PR	**Core XV** – Project*	4	4	**40**	**60**	100
		7BPHE3A/ 7BPHE3B/ 7BPHE3C	**Elective– III**– **A)**Microprocessors **(or) B)** Computer Programming in C++ **(or) C)** Fundamentals of Nano Science	5	5	25	75	100
	IV	7SBS6B4/ 7SBS6B5/ 7SBS6B6/ 7SBS6B7	**(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 for project or any theoretical or electronics project.**

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

B.Sc. PHYSICS

I YEAR – I SEMESTER
COURSE CODE: 7BPH1C1

CORE COURSE-I – PROPERTIES OF MATTER AND SOUND

Unit I ELASTICITY

Hooke's Law – Stress and Strain – 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 – Torsional 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 using oscillation method.

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 – excess pressure inside a spherical liquid drop and spherical bubble –Determination of surface tension of a liquid by Jaeger's method.

Definition of Viscosity – Coefficient of Viscosity and its dimensions –Equation of continuity– Poiseuille's formula for the rate of flow of a liquid in a capillary tube — 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.Music and noise: Intensity and Loudness of sound – decibels – Intensity level –characteristics of musical sound–consonance and dissonance–musical scale–tempered scale–noise pollution. Laws of Transverse Vibrations–Sonometer verification of laws.– Melde's String

Unit V SOUND

Expression for longitudinal waves in gases –Newton's formula for velocity of sound – Laplace correction – effect of temperature, pressure, density, humidity and wind – velocity of sound in water – velocity of sound in air – velocity of sound in isotropic solids – wave velocity and molecular velocity.

Ultrasonics: Production of ultrasonic wave–Piezoelectric crystal method– Properties – detection – Applications.

Text Books:

1. Properties of matter – Brijlal and Subramanyam, Eurasia Publishing co., III Edition New Delhi, 1983
2. A text book of Sound – R.L.Saigal, S.Chand and Company Ltd., New Delhi, 1985
3. Waves and Oscillations – Subramanyam and Brijlal, Vikas Publishing House Pvt. Ltd, New Delhi, II Edition 2009

Books for Reference:

1. Elements of properties of matter – D.S.Mathur, S.Chand & Company Ltd, New Delhi, 10th Edition 1976
2. A text book of Sound – Khanna and Bedi Atma Ram & Son's, New Delhi

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I YEAR – I SEMESTER
COURSE CODE: 7BPH1C2

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 – Torque – Angular momentum– 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

Michelson Morley experiment and its importance – Postulates of special theory of relativity – Galilean and Lorentz transformations. Length contraction and time dilation – Addition of velocities – Einstein's mass energy equivalence.

Text Books:

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

Books for Reference:

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

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I YEAR – I / II SEMESTER
COURSE CODE: 7BPH2P1

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: 7BPH2C1

CORE COURSE IV – THERMAL AND STATISTICAL PHYSICS

Unit I CALORIMETRY

Specific heat capacity of solids – Regnault's method of mixtures(solid) – specific heat capacity of liquids – Callendar and Barnes method – 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 – physical significance of entropy - change of entropy when ice converted into steam - third law of thermodynamics.

Unit III LOW TEMPERATURE PHYSICS

Joule Thomson effect – porous plug experiment. Liquefaction of oxygen – Principle of regenerative cooling – Helium I and II - 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- energy distribution in black body spectrum - Wien's law – Rayleigh Jean's law – Stefan's law – experimental verification of Stefan's law - solar constant – water flow pyrheliometer

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.

Text Books:

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

Books for Reference:

1. Heat & Thermodynamics – J.B. Rajan, SC Publisher, New Delhi, 1985.
2. Concepts of Physics Volume I and II – H.C. Varma, Bharati Bhawan Publishers, New Delhi, 2015

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I YEAR – II SEMESTER
COURSE CODE: 7BPH2C2

CORE COURSE V – ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM

Unit I ELECTROSTATICS

Coulomb‘s inverse square law in electrostatics–Electric field–Gauss law and applications –Capacity – Units of Capacity – Capacity of a condenser – capacity of a parallel plate condenser – capacity of a parallel plate capacitor with dielectric medium – capacity of a spherical capacitor – Capacity of a cylindrical capacitor – Energy density and power density of 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 effect – Laws of thermoelectric circuits - Peltier effect -- Peltier coefficient - Thomson effect – Thomson coefficient – thermoelectric diagrams and their uses – Boy’s radio micrometer.

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 inductance of a coil – coefficient of self inductance – self inductance of a long solenoid – self inductance by Rayleigh’s method – coefficient of mutual induction between a pair of coils – determination of mutual inductance- - 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.

Text Books:

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

Books for Reference:

1. Electricity and Magnetism – M.Narayanamurthi and N.Nagaratnam, The National Publishing Co., Madras, 1988.
2. Electricity and Magnetism–A.S. Mahajan and A.A. Rangwala, Tata McGraw–Hill Company, New Delhi, 2007

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II YEAR – III SEMESTER
COURSE CODE: 7BPH3C1

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 – Theory of formation of rainbow.

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) – Jamin's interferometers – determination of refractive index of gases

Unit III DIFFRACTION

Fresnel's diffraction –Rectilinear propagation of light – zone plate –diffraction at circular aperture – opaque circular disc – 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 – Infrared spectroscopy (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.

Text Books:

1. Optics and Spectroscopy – R.Murugeshan, S. Chand and co., 6th Edition, New Delhi, 2008.
2. A text book of Optics – Subramanyam and Brijlal, S. Chand and co.., 22nd Edition, New Delhi 2004.
3. Elements of Spectroscopy – S.L. Gupta, V.Kumar and R.C.Sharma Pragati Prakashan, 13th Edition, Meerut, 1997

Books for Reference:

1. Optics – Sathyaprakash, Ratan Prakashan Mandhir, VIIth Edition, New Delhi, 1990.
2. Introduction to Molecular Spectroscopy –C.N.Banewell,TMH publishing co. IV Edition, New Delhi, 2006.
3. Molecular structure and spectroscopy – G.Aruldhass, PHI Pvt Ltd, , II Edition, New Delhi, 2007.

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II YEAR – III / IV SEMESTER
COURSE CODE: 7BPH4P1

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

(Any **FIFTEEN** experiments)

1. Calibration of low range Voltmeter - Potentiometer
2. Calibration of ammeter – Potentiometer
3. Comparison of low resistances – Potentiometer
4. Calibration of high range Voltmeter - Potentiometer
5. Thermo – emf – Potentiometer
6. Carey – Foster Bridge – Temperature Coefficient
7. Field along the axis of a coil – Deflection magnetometer
8. Deflection magnetometer – Tan A and Tan B Position
9. Thermal conductivity – Lee's disc method
10. Thermal conductivity of rubber
11. Specific heat capacity of liquid – Newton's law of cooling
12. Specific heat capacity of liquid – Joule's Calorimeter
13. Spectrometer – Refractive index of a solid prism
14. Spectrometer – Dispersive power of prism
15. Spectrometer – i – d curve
16. Hartmann's interpolation formula
17. Spectrometer - Biprism
18. Spectrometer - 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: 7BPH4C1

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 –Frank and Hertz 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 – 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 – 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).

Elementary Particles – Hadrons – leptons – Mesons – Baryons – Hyperons – Antiparticle and antimatter.

Text Books:

1. Modern Physics – R.Murugeshan , S.Chand &Co; 13th Edition, New Delhi, 2008.
2. Modern Physics –Sehgal & Chopra; Sultan Chand and publication, 9th Edition, NewDelhi, 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, V Edition, Mumbai, 2008.
5. Atomic & Nuclear Physics– Subramanyam & Brijal, S.Chand & Co; V Edition, New Delhi, 2003.

Books for Reference:

1. Atomic Physics– J.B Rajam, S.Chand & Co; NewDelhi 1959
2. Concepts of Nuclear Physics – Bernard L Cohen, Tata Mc-Graw Hill Publishing Co., New Delhi, 1959

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III YEAR – V SEMESTER
COURSE CODE: 7BPH5C1

CORE COURSE IX – ANALOG ELECTRONICS

Unit I SEMICONDUCTOR DIODES AND REGULATED POWER SUPPLIES

Semiconductor – p-n junction diode – rectifiers – half and full wave rectifiers – bridge rectifier – efficiency – ripple factor – R-C and π section filter circuits.
Zener diode – characteristics – voltage regulator – regulated power supply using zener diode.

Unit II TRANSISTORS AND BIASING

Transistor action – CB, CE & CC modes – comparison – amplifier in CE arrangement – load line analysis – cut – off and saturation – Relation between α and β – Transistor biasing - base resistor bias - feedback resistor bias - voltage divider bias – JFET – construction and working - characteristic parameters.

Unit III AMPLIFIERS

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

Unit IV 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.

Feedback principle – Negative and positive feedback – current gain and voltage gain in negative feedback amplifier – Barkhasan condition for oscillation – damped and undamped oscillations –Hartley, Colpitt and phase shift Oscillator.

Unit V OPERATIONAL AMPLIFIER

Characteristics of an ideal op-amp – virtual ground - op-amp biasing – Non-inverting & Inverting amplifiers– Applications of op-amp – adder, subtractor, differentiator, integrator.

op-amp signal generators: Phase shift, Hartley, Square wave and triangular wave generators.

Text Books:

1. V.K.Mehta, Principles of Electronics, S.Chand & Co Ltd.,10th Edition, New Delhi, 2007.
2. R.S.Sedha – Text Book of Applied Electronics, S.Chand & Co Ltd., II Edition, New Delhi, 2004.
3. Electronic Devices and Circuits – Salivahanan and Suresh Kumar, Mc Graw Hill Edn. New Delhi, 2012

Books for Reference:

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

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III YEAR – V SEMESTER
COURSE CODE: 7BPH5C2

CORE COURSE X – COMPUTER PROGRAMMING IN C

Unit I FUNDAMENTALS

The character set – identifiers and keywords – data types – constants – variables – declarations – expressions – Library functions.

Operator and expressions: Arithmetic 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 and ARRAYS

Branching statement: The if and if – else statement – nested if statement-the switch statement - the goto statement.

Looping statement: while statement - do–while statement- for statement –break statement – continue statement.

Defining an array – declaring, initializing one dimensional – two dimensional – Multidimensional arrays – reading and writing strings.

Unit III FUNCTIONS

Defining a function – Accessing a function – declaration a function - function prototypes – passing Arguments to a function – categories of function - Recursion. Storage classes – Automatic variables – External variables – Static variables- Register variables.

Unit IV Pointers and Structures

Pointers – Pointer declaration – accessing pointer variables – pointers and one dimensional arrays – passing pointers to a function – call by value and call by reference– Arrays of pointers.

Defining a structure– declaring structure variable– accessing structure members - processing structures – arrays of structures.

Unit V Writing Programs

1. Average of set of numbers.
2. Conversion of Celsius to Fahrenheit
3. Factorial of a given number
4. Roots of a quadratic equation
5. Add/Subtract two matrices
6. Evaluation of sine series
7. Smallest and largest number of an array.
8. Sorting numbers in ascending / descending order using function.
9. Arranging the names in alphabetical order.

Text Books:

1. Programming in ANSI C–V.Balagurusamy TMH Publishing Co.,IIIEdition,New Delhi,2004.
2. Programming in C–D.Ravichandran, New Age International,I Edition,New Delhi,2002

Books for Reference:

1. Programming in C–Byron Gottfried,TMH Publishing Co.,II Edition,New Delhi, 1994.
2. Programming in C–Stephen G.Kochen,Developers Library,IIIEdition,New Delhi,1998

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III YEAR – V / VI SEMESTER
COURSE CODE: 7BPH6P1

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. Charge of electron – copper voltmeter
6. Small angle prism – spectrometer
7. i – i' Curve – spectrometer
8. Grating – Normal incidence - spectrometer
9. Series resonance – LCR bridge
10. Parallel resonance – LCR bridge
11. Comparison of low resistance using spot galvanometer/BG/TG
12. Comparison of mutual inductance – spot galvanometer/BG
13. Comparison of capacitance – spot galvanometer/BG
14. Absolute determination of capacitance – spot galvanometer/BG
15. High resistance leakage – spot galvanometer/BG
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 sine series – C programming

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III YEAR – V / VI SEMESTER
COURSE CODE: 7BPH6P2

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

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

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

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III YEAR – V SEMESTER
COURSE CODE: 7BPHE1A

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 – 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.

Text Books:

1. B.D.Gupta – Mathematical Physics – Vikas Publishing House Pvt. Ltd., IVth Edition, New Delhi, 2010.
2. H.K.Dass – Mathematical Physics, S.Chand Company, New Delhi, 2007.
3. Satyaprakash – Mathematical Physics – Sultan Chand and Sons, 6th Edition, New Delhi, 2014.
4. A.W.Joshi – Elements of Group Theory for Physicist – New age International, New Delhi, IVth Edition 1997.
5. Mechanics and Mathematical methods by R. Murugeshan – S.Chand & Co. Ltd. New Delhi, 2003

Books for Reference:

1. A.W.Joshi – Matrices and Tensors in Physics – New Age International Publishers, New Delhi, 1995.
2. L.A.Pipes and L.R.Harvill – Applied Mathematics for Engineering and Physicist – McGraw Hill, Singapore – 1967.

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III YEAR – V SEMESTER
COURSE CODE: 7BPHE1B

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.

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–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.

Text Books:

1. G.D.Rai–Non-Conventional Sources of Energy,Khanna Publishers,(IV)NewDelhi,2010
2. H.C.Jain–Non-Conventional Sources of Energy,Sterling. Publication,New Delhi,2009

Books for Reference:

1. G.D.Rai – Solar Energy Utilization, Khanna Publishers, V Edn. New Delhi, 2009.
2. Sukatme–Solar Energy,Tata McGraw Hill Publishing company Ltd.,II Edn.,New Delhi, 1996
3. M.P.Agarwal– Solar Energy, S.Chand & Co., I Edition, New Delhi , 1983.
4. Janet Ramage–Energy: guide book, Oxford University Press, New Delhi , 1983

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III YEAR – V SEMESTER
COURSE CODE: 7BPHE1C

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 – methods of Q Switching - mode locking - active and passive mode locking (qualitative only).

Unit II LASER TYPE AND OUTPUT MODULATION METHODS

Principle and working and energy level diagram of – Ruby laser – Nd-YaG Laser – He-Ne laser, CO_2 Laser – Semi Conductor Laser.

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.

Unit IV OPTICAL FIBRES

Basic structure of an Optical fibre – Acceptance angle – Numerical aperture – Propagation of light through an optical fibre – Theory of modes of 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 –types of optical couplers – Splicing.

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

Text Books:

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

Books for Reference:

1. Introduction to Fibre Optics–Ajoy Ghatak & K.Thygarajan, Cambridge University Press, New Delhi, 2005
2. Solid State Physics – P.K.Palanisamy, Scitech Publication (India) Private Ltd, New Delhi, 2009

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III YEAR – V SEMESTER
COURSE CODE: 7BPHE2A

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.

Text Books:

1. Electronic communication system – George Kennedy, TMH Pub Co, IVEdition, New Delhi 1999
2. Fundamentals of Electronic & Radio – GK. Mithal, Khanna Publishers, New Delhi 2003
3. Electronic Communication – Roddy & Coolon, PHJ Ltd., IV Edn, New Delhi 1998

Books for Reference:

1. Electronic & Radio Engineering –M.L. Gupta, Dhanpat Rai Pub Company, New Delhi, 2001
2. Principle of Communication system–Taub & Schilling, TMH Publishers., Edn, New Delhi 1999.

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III YEAR – V SEMESTER
COURSE CODE: 7BPHE2B

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 Books:

1. Numerical Analysis – S.S.Sastry, ,PHI Learning Private Limited, New Delhi, V Edition, New Delhi 2012
2. Fundamentals of Mathematical Statistics – Gupta.S.C & Kapoor,V.K, , Sultan Chand & sons, New Delhi, 1994.

Books for Reference:

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

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III YEAR – V SEMESTER
COURSE CODE: 7BPHE2C

ELECTIVE COURSE II (C) – SOLID STATE PHYSICS

Unit I CRYSTAL STRUCTURE

Definition in crystallography – Lattice points – space lattice – unit cell – Lattice parameters of an unit cell – classification of crystal directions – Miller indices – perpendicular distance between two parallel planes in a cubic crystal lattice – important features of miller indices.

Unit II 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 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 SUPER CONDUCTIVITY

Distinction between conductors and insulators (Bond theory) – Critical temperature – properties of super conductors – Meissner effect – BCS theory.

D.C. Josephson effect – Applications of high temperature super conductors – super conducting magnets

Text Books:

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

Books for Reference:

1. Introduction to Solid State Physics – C. Kittel, Wiley Eastern Limited, 5th Edition, New Delhi, 2004
2. Solid State Physics – S.O. Pillai, New Age International Private Limited, New Delhi, 1997

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III YEAR – VI SEMESTER
COURSE CODE: 7BPH6C1

CORE COURSE XIII – ELEMENTS OF THEORETICAL PHYSICS

Unit I LAGRANGIAN MECHANICS

Constraints – Types of constraints – Generalized coordinates. Principle of virtual work – D'Alembert's principle – Lagrange's equation from D'Alembert's principle – Applications: Simple pendulum

Unit II 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 step – Barrier penetration problem – 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_-.

Text Books:

1. Modern Physics – R. Murugeshan, S. Chand & Co., 13th 3rd Edition, New Delhi 2008.
2. Textbook of Quantum Mechanics – P.M. Mathews and A. Venkatesan, TMH, II Edition, New Delhi, 2010.
3. Classical Mechanics – Rana and Joag, TMH Publishing Company., I Edn, New Delhi ,1997.
4. Quantum Mechanics – G. Aruldhos, PHI Learning Private Limited, New Delhi 2009

Books for Reference:

1. Classical Mechanics – H. Goldstein, 2nd edition, Naroasa, New Delhi, 2001
2. Introduction to Classical Mechanics – R.C. Takwale and P.S.Purnik, Mc- Graw Hill Pvt. New Delhi 2008
3. Quantum Mechanics – L.I. Schiff, Tata Mc-Graw Hill Publishing Company, New Delhi, 1985

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III YEAR – VI SEMESTER
COURSE CODE: 7BPH6C2

CORE COURSE XIV – DIGITAL ELECTRONICS

Unit I FUNDAMENTALS

Codes and Number Systems–Decimal, Binary, Octal and Hexadecimal number systems–Inter conversions–8421BCD code–Other 4 bit BCD codes–Excess 3 code–Graycode

Basic LOGIC gates – AND, OR, NOT, NAND, EX-OR functions – their truth tables. NAND & NOR as Universal gates – De Morgan's theorem – Boolean Algebra - associative law, commutative law and distributive law.

Unit II COMBINATIONAL LOGIC

Binary Arithmetic Circuits – Half Adder – Full Adder– 8421 BCD Adder – Half Subtractor – Full Subtractor.

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.
Registers & Counters : Registers – Shift Registers – Shift Right, Shift Left Registers – Counters – Ring counter – Asynchronous (Ripple) Counter – Mod 10 counter – 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 accuracy and resolution.

Unit V MEMORY CIRCUITS AND MICROPROCESSORS

Programming bipolar PROMS – MOS static RAM cell – MOS dynamic RAM cell.
Microprocessors: Introduction to microprocessor - internal architecture of Intel 8085 microprocessor - Block diagram – Registers - internal Bus organization- functional details of 8085 IC pins and Control signals.

Text Books:

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

Books for Reference:

1. Digital Technology Principle and Practice – Virendra Kumar, New Age International Pvt. Ltd., New Delhi, 2005.
2. Digital Fundamentals – Floyd and Jain, Pearson Edn. Singapore, 2006
3. Digital Circuits and Logic Design – Samuel.C.Lee, Prentice Hall of India Pvt.Ltd, New Delhi, 2005

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III YEAR – VI SEMESTER
COURSE CODE: 7BPH6PR

CORE COURSE XV – PROJECT

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III YEAR – VI SEMESTER
COURSE CODE: 7BPHE3A

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)

Text Books:

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

Books for Reference:

1. Pal Chaudhary P – Computer Organisation and Design,Prentice Hall,New Delhi, 1995.
2. Bartee T C – Digital Computer Fundamentals, Tata Mc.Graw Hill, New York, 1977
3. Hayes J P – Computer Organisation and Architecture – 2nd Edition, Tata Mc Graw Hill, New York.
4. Tanenbaum,A.S – Structured Computer Organisation, 3rd Edition", Prentice Hall, New Jersey.

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III YEAR - VI SEMESTER
COURSE CODE: 7BPHE3B

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.

Text Books:

1. Object Oriented Programming with C++ – E. Balagurusamy, TMH Publishing Co.Ltd., II Edn, 2007.
2. Object Oriented Programming in C++ – Robert Lafore, Tata Mc-Graw Hill Private, New Delhi, 2006
3. C++ – Schildt, Tata Mc-Graw Hill Private Company Ltd., New Delhi, 2003
4. Let us C++ – Yashavant P Kanetkar, BPB Publishing Company, New Delhi, 2006

Books for Reference:

1. The C++ programming language – Bjarne Stroutstrup, Addison-Wesley Pearson Education, Canada, 2013
2. C++ primer–Lippmann,Josee Lajoic& Barbava Moo, Westford, Massachusetts, 2015.

III YEAR – VI SEMESTER
COURSE CODE: 7BPHE3C

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 Carbon Nano Tubes – Single Walled Carbon Nano Tubes – Multi walled Carbon Nano Tubes – Properties - Carbon Nano Tubes based Nano objects- Applications.

Unit III Fabrication

Fabrication methods – Top down processes – Milling, lithographics, 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 – Transmission 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.

Books for Reference and Study:

1. Principles of Nano Science and Nano Technology – M.A.Shah , Tokeer Ahmed, Narosa Publishing Co., New Delhi, 2010
2. Nanomaterials and Nano devices - G.Mohan Kumar, Narosa Publishing Co., New Delhi, 2016
3. Nano Science and Nano technology- M.S.Ramachandra Rao and Shubra Singh, Wiley, 2013
4. Nanotechnology – Mark Ratner, Daniel Ratner, Pearson Edn., 2003

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