KARNATAK UNIVERSITY, DHARWAD.

Ref. No. KU/Aca(S&T)/(VVV-01)//Phy/UG/2011-12/ 150

Date: 16-4-2012
27 APR 2012

NOTIFICATION

Sub: Revision of Syllabus for I and II semesters of B.Sc., Physics & Electronics from the academic year 2012-13 and III & IV semesters and also V & VI semesters from the subsequent years i.e., from 2013-14 and 2014-15.

Ref: 1) BOS Res. No. 03, dt ; 22.10.2011.
2) Faculty in Science Res. No. 01, dt; 12.01.2012.
3) Academic Council Res. No.11, dt. 26.03.2012.
4) Vice-Chancellor's Order dated ; 16-4-2012

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Adverting to the above, the Principals of constituent and affiliated Science degree colleges are hereby informed that the revised syllabus for B.Sc., Physics & Electronics I,II, III, IV, V & VI semesters course will come into force with effect from the academic years as shown below;

1. B.Sc. I & II Semesters	-	2012-13
2. B.Sc. III & IV Semesters	-	2013-14
3. B.Sc. V & VI Semesters	-	2014-15

Hence, the contents of this notification may please be brought to the notice of the teachers, students and all concerned.

The concerned syllabus may be obtained through the Karnatak University, Web Site: www.kud.ac.in.

16/4
REGISTRAR

To,

Principals of all the Constituent and Affiliated Science degree colleges coming under the jurisdiction of Karnatak University, Dharwad.

Copy F.W.cs to;

1. Dean, Faculty of Science & Technology, P.G. Dept of studies in Geology, K.U.Dharwad.
2. The Registrar (Evaluation) K.U. Dharwad.
3. The Chairman, BOS in (UG) Physics, PG Dept. of Studies in Physics, K.U.Dharwad.
4. The Chairman, BOS in (UG) Electronics, PG Dept. of Studies in Physics, K.U.Dharwad.
5. Dr. R.M Vatnal, In charge Director, Information Technology, Exam Section, room No. 104, K.U.Dharwad, with a request to put the said Notification and Syllabi in the University website: www.kud.ac.in

Copy to:

1. P.S. to Vice-Chancellor, K.U. Dharwad.
2. S.A. to Registrar, K.U. Dharwad.
3. O.S. Exam Section (Science Faculty (UG)) K.U.D.
4. O.S. Exam Section (Confidential) K.U.D
5. O.S. Exam Section (QP Branch) K.U.D.
6. O.S. Exam Section (GAD) K.U.D.

B.Sc. (Semester System)
Optional Subject: **PHYSICS**
Teaching and Evaluation Scheme
(w.e.f. 2011 - 12)

Semester	Subject Code	Particulars	Instruction Hours per week	Examination		
				Duration	Max. Marks	
					Internal Assessment	Semester end
I	PHY 1.1	Mechanics and Properties of matter	5hrs	3hrs	20	80
	PHY 1.2	Physics Lab-I	4hrs	4hrs	10	40
II	PHY 2.1	Kinetic theory of Gasses, Thermodynamics, Radiation, Energy Sources and Sound	5hrs	3hrs	20	80
	PHY 2.2	Physics Lab-II	4hrs	4hrs	10	40
III	PHY 3.1	Geometrical Optics and Electricity	5hrs	3hrs	20	80
	PHY 3.2	Physics Lab-III	4hrs	4hrs	10	40
IV	PHY 4.1	Physical Optics, Thermoelectricity and Electromagnetic theory	5hrs	3hrs	20	80
	PHY 4.2	Physics Lab-IV	4hrs	4hrs	10	40
V	PHY 5.1	Classical Mechanics, Quantum Mechanics, and Atomic spectra	3hrs	3hrs	20	80
	PHY 5.2	Molecular Spectra, Lasers, Relativity and Electronics	3hrs	3hrs	20	80
	PHY 5.3	Physics Lab- V	4hrs	4hrs	10	40
	PHY 5.4	Physics Lab-VI	4hrs	4hrs	10	40
VI	PHY 6.1	Solid State Physics, Nuclear Physics, and Nanoscience	3hrs	3hrs	20	80
	PHY 6.2	Astrophysics, Computational Physics, Electronics and Communication	3hrs	3hrs	20	80
	PHY 6.3	Physics Lab- VII	4hrs	4hrs	10	40
	PHY 6.4	Physics Lab-VIII	4hrs	4hrs	10	40

Revised syllabus w.e.f. 2011-12

B.Sc. Semester - I
Optional Subject: Physics

PHY 1.1: Mechanics and properties of matter

UNIT 1:

Frames of References:

Inertial frames, Galilean transformation equations (derivation), Invariance of Newton's Laws under Galilean Transformations, Invariance of laws of conservation of momentum and energy under Galilean transformations, Non-inertial frames, fictitious force, rotating frame of reference, concept of Coriolis force.

04 Hrs

Problems 01 Hrs

Linear Momentum:

Definition of Linear Momentum, Law of conservation of linear momentum for a system of particles, Centre of mass of a system of particles, Position coordinates of the Centre of Mass, Motion of center of mass, collision between two particles which stick together (inelastic collision) and do not stick together (elastic collision) in laboratory frame of reference (One Dimensional), Conservation of linear momentum in case of variable mass: examples i) Single stage rocket (expression for velocity neglecting the weight) ii) Double stage rocket

05 Hrs

Problems 02 Hrs

UNIT 2:

Angular momentum

Definition of angular momentum and its relation to angular velocity, Definition of Torque and its relation to angular velocity, Relation between angular momentum and Torque, Law of conservation of angular momentum, Work done by a Torque, Central force, Kepler's second law of Planetary motion (derivation).

05 Hrs

Problems 01 Hrs

Simple Harmonic Motion (SHM)

Definition of SHM, Expressions for displacement, velocity and acceleration of a particle executing SHM, Differential equation of linear SHM, Total energy of a particle executing SHM (Derivation), Expressions for the period of oscillation of flat spiral spring (Derivation), Composition of two linear SHM,s of equal periods acting at right angles to each other, Lissajous figures.

05 Hrs

Problems 01 Hrs

UNIT 3: Moment of Inertia

Kinetic Energy of a rotating body, Definition of M.I. and radius of gyration, Perpendicular and Parallel axis theorems (derivations), M.I of rectangular lamina, Annular ring and circular disc, (derivations), Hallow and Solid Cylinders (mention of expressions), M. I. of Flywheel (Theory and Experimental determination).

07 Hrs

Problems 02 Hrs

Acceleration due to Gravity

Theory of Compound Pendulum, Interchangeability of Centres of suspension and oscillation, Four points collinear with the C.G. about which the time period is same, conditions for Maximum and Minimum time periods, Bar Pendulum, Experimental determination of "g" using Bar Pendulum, Bifilar Suspension with Parallel threads.

05 Hrs

Problems 01 Hrs

UNIT 4: Elaticity

Stress, Strain, Elastic limit, Hook's law, Modulii of elasticity for isotropic materials, Relation between elastic constants (Derivation), Definition of Poisson's Ratio, Work done for unit Volume in stretching a wire, Bending of Beams-Neutral surface, Neutral axis, Plane of Bending, Bending Moment, Expression for bending moment (Derivation), uniform bending (mention formula), Theory of light cantilever (Derivation) and I-section girder (qualitative), Torsion expression for the couple per unit twist, Torsional pendulum, Experimental determination of "Y" by bending.

07 Hrs

Problems 02 Hrs

UNIT 5:

Surface Tension.

Molecular forces, Molecular range, Surface energy, Pressure difference across a curved liquid surface, Excess pressure inside a spherical liquid drop, (or an air bubble inside a liquid), Excess pressure inside a soap Bubble, Difference of pressure across a curved surface, Angle of Contact, Rise of liquid in a capillary tube, Determination of surface tension by capillary rise method and Jeager's method with relevant theory.

06 Hrs

Problems 01 Hrs

Viscosity

Viscosity of a liquid, Streamline and turbulent motion, Newton's law of viscous flow, Stoke's law of Viscosity, determination of co-efficient of viscosity of liquid by Stoke's method with theory, Derivation of Poiseuille's equation.

04 Hrs

Problems 01 Hrs

Reference books:

1. Mechanics (VI-Edition) - J.C.Upadhyay –Ramprasad & Sons,Agra, 2005.
2. Mechanics (XX-Edition) – D.S.Mathur- S. Chand & Company Ltd., New-Delhi, 2007.
3. Mechanics & Electrodynamics (XVII-Edition, Course- 1 & 2) – Brijlal, Subramanyam & Jivan Seshan, S. Chand & Company Ltd., New-Delhi, 2008.
4. Properties of Matter (XIII-Edition) – Brijlal & Subramanyam, Eurasia Publishing House Pvt. Ltd., New-Delhi, 2001.
5. Elements of Properties of Matter (XXVIII-Edition), D.S.Mathur - S. Chand & Company Ltd., New-Delhi, 2005.
6. Physics , Vol. No.I (V-Edition)– Resnick, Halliday & Krane – John Wiley & Sons Inc., New-York, Singapore, 2005.
7. Berkely Physics, Vol. No.I – ABC Publications, Bangalore & New-Delhi.
8. University Physics (XI-Edition)- Young & Freedman – Pearson Education, 2004.

PHY 1.2: Physics Lab-1

List of Experiments:

1. Bar Pendulum L vs. T and L^2 Vs. LT^2 graphs.
2. M.I. of the Fly-Wheel
3. Verification of Parallel axes theorem of Moment of Inertia using Bar Pendulum.
4. Verification of Perpendicular axes theorem of Moment of Inertia using Tortional Pendulum.
5. Bifilar Suspension.
6. Young's Modulus of the material of a wire using Searls' Apparatus.
7. Y- by Uniform bending- Load depression Graph.
8. Torsion Pendulum – Rigidity of Modulus.
9. Co-efficient of viscosity of liquid by Stoke's method.
10. Surface Tension by Jeager's Method / Quincke's method.
11. Radius of Capillary tube by mercury pellet method.
12. Use of CRO – Measurement of AC voltage and frequency for sine and square waves.
13. Use of multimeter (demonstration)

Note:

1. Experiments of four hours duration.
2. Minimum of Eight experiments to be performed.

Revised syllabus w.e.f. 2011-12
B.Sc. Semester - II
Optional Subject: Physics

PHY 2.1 : Kinetic theory of gasses, Thermodynamics, Radiation, Energy Sources and Sound,

UNIT 1: Kinetic theory of gases

Maxwell's law of distribution of velocities (qualitative) & its experimental verification. Average, r.m.s. & most probable velocity (derivation). Bose-Einstein & Fermi-Dirac distribution (qualitative), Mean free path, mention of Clausius-Maxwell's expressions for mean free path, Brownian motion, Einstein's expression (derivation), determination of Avogadro's number; Transport phenomena — Viscosity. thermal conductivity, diffusion, expression for η & κ (derivations) **10 hrs**
Problems **02 hrs**

UNIT 2: Thermodynamics

Heat engines: Otto engine, Otto cycle, expression for efficiency, Diesel engine, Diesel cycle, expression for efficiency & Carnot's theorem
Entropy: Concept of entropy, change in entropy in reversible & irreversible processes, entropy-temperature diagram, second law of thermodynamics.
Maxwell's relations-derivation of Maxwell's relations, applications to – 1) Clausius-Clapeyron's equation, 2) Clausius equations (specific heat of saturated vapours) **10 hrs**
Problems **02 hrs**

UNIT 3: Low temperature and pressure

Measurement of low temperature, exhaust pump & its characteristics, exhaust pressure, degree of vacuum attainable, speed of pump:

1) Diffusion pump-principle, construction & working
2) Ionisation gauge-principle,construction & working.

Production of low temperature - Joule Thomson effect, Porous plug experiment with theory, Thermodynamical analysis of Joule Thomson effect **10 hrs**
Problems **02 hrs**

UNIT 4: Radiation

Radiation pressure, (qualitative), Stefan's law & its derivation using radiation pressure. Laboratory method for determination of Stefan's constant. Wein's displacement law with derivation, Rayleigh-Jeans's law (qualitative), Planck's law of radiation & its derivation. Ferry's total radiation pyrometer. **10 hrs**
Problems **02 hrs**

UNIT 5:

Energy Sources

Introduction to energy Sources: Energy sources and their availability; conventional and non-conventional energy sources, Renewable energy sources; advantages and prospects.
Solar energy: Solar constant, solar radiation at earth's surface, attenuation of beam radiation.

Solar cell and its characteristics. **05 hrs**

Sound

Free, forced and sustained vibrations, resonance with examples. Analytical treatment of damped and forced vibrations. Theory of Helmoltz resonator, condition for amplitude of resonance, phase of forced vibration, effect of damping on phase of forced vibration, effect of damping on phase, Fourier theorem and its applications to plucked strings. **06 Hrs**

Problems. **02 Hrs**

Reference books:

1. Kinetic Theory of Gases(I-Edition) – V.N.Kelkar – Ideal Book Service, Pune, 1967.
2. Kinetic Theory of Gases(II-Edition) – R.S.Bhoosnurmath – IBH Prakashana, Bangalore, 1981.
3. Heat & Thermodynamics and Statistical Physics(XVIII-Edition) – Singhal, Agarwal & Satyaprakash – Pragati Prakashan, Meerut, 2006.
4. Heat & Thermodynamics and Statistical Physics(I-Edition) – Brijlal , Subramanyam & Hemne - S. Chand & Company Ltd., New-Delhi, 2008.
5. Heat and Thermodynamics (I-Edition) – D.S.Mathur - S. Chand & Company Ltd., New-Delhi, 1991.
6. A Treatise on Heat – Shaha and Srivatsava.
7. A text book of heat - J.B.Rajam.
8. Energy Sources – G.D.Rai
9. Text of sound (II-Edition) - Brijlal & Subramanyam - Vikas Publishing house, New-Delhi, 1977.
10. Text of sound (I-Edition) – Khanna & Bedi – Atmaram & Sons., Delhi, 1985.
11. Text of sound (III-Edition) – M.Ghosh - S. Chand & Company Ltd., New-Delhi, 1989.

PHY 2.2 : Physics Lab – II

List of experiments:

1. Volume Resonator
2. Frequency of AC using Sonometer
3. Velocity of sound through wire using sonometer
4. Use of CRO – study of Lissajous figures
5. Lee's method of determination of thermal conductivity of rubber

6. Thermal conductivity of poor conductor (perspex)
7. Specific heat by cooling
8. Verification of Stefan's Law.
9. Determination of Stefan's constant
10. 'J' by electrical method – radiation correction by graphical method
11. 'J' by continuous flow method
12. Velocity of sound using Kundt's tube

Note

1. Experiments are of four hours' duration
2. Minimum of eight experiments to be performed

B.Sc. Semester-III
(w.e.f. 2012-13)

Optional Subject: Physics

PHY 3.1 : Geometrical Optics and Electricity

UNIT 1:

Fermat's principle: Statement & explanation, derivation of laws of reflection & Snell's law. Sign convention, refraction at a spherical surface. Abbe's sign convention (derivation), Lagrange's law & Helmholtz relation (derivation). Aplanatic points & surfaces (qualitative). **04 hrs**

Cardinal points: Cardinal points of optical systems. Equivalent focal length of two thin lenses separated by a distance & location of cardinal points of a thick lens (derivation). **07 hrs**

Problems **02 hrs**

Aberrations: Spherical & chromatic aberrations. Methods to reduce spherical aberrations (qualitative). Condition for achromatism of two thin lenses (1) in contact, (2) separated by a distance. **03 hrs**

Occulars : Ramsden & Huygen's eye piece (with discussion of their cardinal points). **02 hrs**

Problems **01 hr**

UNIT 2: Electrostatics

Electric polarization, Gauss law in dielectrics and electric displacement. Boundary conditions at a surface separating the two dielectric media(with derivation). Derivation of relation between electric displacement 'D', electric field 'E' & polarization 'P'. D & P in terms of E. Atomic polarisability, electric susceptibility, relation between dielectric constant & electric suscebtibility. Mention of expression for force between two charges in a dielectric medium separated by a large distance. Expression for mechanical stress on surface of charged conductor – application to a electrified soap bubble. Expression for electrostatic energy in the medium surrounding charged conductors. Derivation of Clausius–Mosotti equations & its limitations. Electrical images, use to earthed conducting plane & a sphere **08 hrs**

Problems - **02 hrs**

UNIT 3:

Current Electricity

Statement of Biot-Savart' law, derive the expression for magnetic field due to Straight conductor carrying current, mention the expression for the field along the axis of a circular coil & discuss the special cases. Helmholtz galvanometer-principle, construction & working. Ampere's ciruital law-statement, proof & its applications to derive the magnetic field due to Solenoid & Toroid. **06 hrs**

Problems **02 hrs**

Transient currents: Theory of growth & decay of current through RL circuit. Theory of charging & discharging of capacitor through RC circuit. Time constants of RL & RC circuits. Measurement of high resistance by leakage method. **05 hrs**

Problems **02 hrs**

UNIT 4: Alternating current:

Operator j, Argand diagram. LCR series ciruit – Expression for current , impedence & phase (using j–operator method). Condition for resonance, resonant frequency, Band width, quality factor & their relation (qualitative)

LCR parallel circuit- Expression for admittance & condition for resonance (using j-operator method). Comparison between series & parallel resonant circuits. **06 hrs**

Problems **02 hrs**

UNIT 5: Electrical instruments & measurements :

Ballistic galvanometer: condition for moving coil galvanometer to be ballistic & dead beat. Theory of BG. Charge and current sensitivity and their relationship, correction for damping. Measurement of capacitance of capacitor using BG by absolute method. Determination of self inductance (L) by Rayleigh's method and mutual inductance by direct method with necessary theory. Theory of earth inductor, determination of B_H,B_V and Φ. **07 hrs**

Problems **02 hrs**

Reference books:

1. Principles of Optics (I-Edition) – B.K.Mathur – New Gopal Printing Press, 1962.
2. Fundamentals of Optics (V-Edition) – Khanna & Bedi – R. Chand & Co., New-Delhi, 1971.
3. A Text book of Optics (I-Edition) – Brijlal & Subramanyam - S. Chand & Company Ltd., New-Delhi, 2006.
4. Optics (IV-Edition) – Ajay Ghatak – Tata Mc Graw-Hill, New-Delhi, 2006
5. Fundamentals of Optics (III-Edition) – Jenkins & White - Mc Graw-Hill, 1957.
6. Geometrical Optics (I-Edition) – D.P.Acharya – Oxford & IBH Pub. Co., New-Delhi,1970.
7. Optics & Spectroscopy (VI-Edition) – Murugeshan, Kirutiga & Shivaprasath - S. Chand & Company Ltd., New-Delhi, 2006.
8. Geometrical Optics – A. Verstraeten.
9. Fundamentals of Electricity and Magnetism – Basudev Ghosh – Books & Allied New Central Book Agency, Calcutta, 2009.
10. Electricity and magnetism- D.N. Vasudev- S.Chand Publication, New Dehli.
11. Electricity and Magnetism- B.S.Agarwal- S.Chand Publication,New Dehli.
12. Electricity and magnetism- Brij lal &Subramasnyam.
13. Fundamentals of optics- Khanna and Gulati.
14. Electricity and magnetism and Atomic physics vol-I – John Yarwood.
15. Electricity and magnetism – A.N.Matveer-Mir publisher,Moscow 1986.
16. Introduction to electrodynamics- D.J.Griffith(3^{rd} ed)Prentice Hall of India,New Dehli.
17. Vector Analysis-Hague
18. Electricity and Magnetism- D.Chattopadhya & Rakshit.
19. Electricity and magnetism- K.K.Tiwari
20. Fundamentals of electricity and magnetism- D.N.Vasudev.
21. Electricity and Magnetism- Segal and Chopra

PHY 3.2 : Physics Lab – III

List of experiments:

1. Calibration of spectromenter
2. Dispersive curve and dispersive power
3. Goniometer
4. Turn table
5. Total internal reflection
6. Determination of magnetic field along the axis of a coil
7. Helmholtz galvanometer
8. Determination of the constants of B.G.
9. Determination of high resistance by leakage method
10. Measurement of capacity by method of mixtures
11. Measurement of capacity by absolute method.
12. R-C time constant

Note

1. Experiments are of four hours' duration
2. Minimum of eight experiments to be performed

B.Sc. Semester-IV
(w.e.f. 2012-13)

Optional Subject: Physics

PHY 4.1 : Physical Optics, Thermoelectricity and Electromagnetic theory

Unit -1 : Interference :

Interference due to division of wave front: Fresnel's biprism. Detemination of wavelength of monochromatic light & thickness of a thin film using biprism.

Interference due to division of amplitude: Stokes' treatment of reflection & transmission at an interface.

Thin films – conditions for maxima & minima case of reflected light (derivation). Multiple reflections. Mention of conditions for maxima & minima in case of transimitted light. Exhibition of colours by thin films. Qualitative discussion of wedge shaped film with mention of expression for path difference. Theory of Newton's rings & determination of wavelength of monochromatic light using Newton's rings. Michelson interferometer. Formation of circular & straight fringes (qualitative). Determination of wavelength of monochromatic light using Michelson interferometer. Standardization of meter. **15 hrs**

Problems **03 hrs**

Unit -2 : Diffraction :

Fresnel class : Fresnel theory of half period zones considering plane waves, rectilinear propagation of light. Zone plate, construction . theory, expression for focal length and comparison with convex lens. **04 hrs**

Problems **01 hr**

Frounhoffer class : Composition of "n" numbers of SHM's of same amplitude & period and having their phases increasing in arithmetic progression. Diffraction at a single slit & at a double slit (qualitative). Plane transmission grating & its theory. Absent spectra & dispersive power of grating.

Resolving power: R.P. of prism & grating. **09 hrs**

Problems **02 hrs**

Unit -3 : Polarisation:

Malus law, Huygen's theory of double diffraction. Positive & negative crystals. Production of circularly & elliptically polarized light. Retardation plates -(i) quarter wave plate, (ii) half wave plate. Analysis of polarized lights: Optical activity, Fresnel's theory of rotatory polarization (qualitative) **08 hrs**

Unit -4 : Thermoelectricity :

Seebeck effect & its explanation. Variation of e.m.f. with temperature, neutral temperature & temperature of inversion. Thermoelectric series. Laws of thermoelectric effect. Peltier effect- explanation, Peltier coefficient & thermodynamics of Peltier effect. Thomson coefficient - explanation, Thomson coefficient. Derivation of the relations $\pi = T\, de/dT$ and $\sigma_a - \sigma_b = T\, d^2e/dT^2$. Thermoelectric (Tait) diagram, its application to determine 1) total emf, 2) Peltier emf, 3) Thomson emf , 4) neutral temperature, and 5) temperature of inversion. **09 hrs**

Problems **02 hrs**

Unit -5 : Electromagnetic theory :
Mathematical background – gradient of scalar, divergence and curl of a vector, their physical significance, Gauss', Stoke's and Green's theorems (without proof).
Maxwell'sequations : derivation of Maxwell's equations in differential forms, mention of integral forms & their physical significance. Derivation of general plane wave equations in free space. Transverse nature of radiation. Poynting theorem (derivation) **08 hrs**

Reference books: Sem-4:

1. Principles of Optics (I-Edition) – B.K.Mathur – New Gopal Printing Press, 1962.
2. Fundamentals of Optics (V-Edition) – Khanna & Bedi – R. Chand & Co., New-Delhi, 1971.
3. A Text book of Optics (I-Edition) – Brijlal & Subramanyam - S. Chand & Company Ltd., New-Delhi, 2006.
4. Optics (IV-Edition) – Ajay Ghatak –Tata Mc Graw-Hill, New-Delhi, 2006
5. Fundamentals of Optics (III-Edition) – Jenkins & White - Mc Graw-Hill, 1957.
6. Geometrical Optics (I-Edition) – D.P.Acharya – Oxford & IBH Pub. Co., New-Delhi,1970.
7. Optics & Spectroscopy (VI-Edition) – Murugeshan, Kirutiga & Shivaprasath - S. Chand & Company Ltd., New-Delhi, 2006.
8. Geometrical Optics – A. Verstraeten.
9. Fundamentals of Electricity and Magnetism – Basudev Ghosh – Books & Allied New Central Book Agency, Calcutta, 2009.
10. Electricity and magnetism- D.N. Vasudev- S.Chand Publication, New Dehli.
11. Electricity and Magnetism- B.S.Agarwal- S.Chand Publication,New Dehli.
12. Electricity and magnetism- Brij lal &Subramasnyam.
13. Fundamentals of optics- Khanna and Gulati.
14. Electricity and magnetism and Atomic physics vol-I – John Yarwood.
15. Electricity and magnetism – A.N.Matveer-Mir publisher,Moscow 1986.
16. Introduction to electrodynamics- D.J.Griffith(3^{rd} ed)Prentice Hall of India,New Dehli.
17. Vector Analysis- Hague
18. Electricity and Magnetism- D.Chattopadhya & Rakshit.
19. Electricity and magnetism- K.K.Tiwari
20. Fundamentals of electricity and magnetism- D.N.Vasudev.
21. Electricity and Magnetism-Segal and Chopra
22. University Physics (XI-Edition)- Young & Freedman – Pearson Education, 2004.
23. Heat & Thermodynamics and Statistical Physics(XVIII-Edition) – Singhal, Agarwal & Satyaprakash – Pragati Prakashan, Meerut, 2006.
24. Physics , Vol. No.II(VI-Edition)– Resnick, Halliday & Krane – John Wiley & Sons Inc., New-York, Singapore, 2005.

PHY 4.2 : Physics Lab – IV

List of experiments:

1. Newton's rings

2. Biprism-Determination of wavelength of monochromatic light.
3. R.P. of a prism
4. R.P of telescope
5. R.P. of grating
6. Diffraction at a wire or aperture using laser
7. Polarimeter
8. Series/ Parallel Resonance (LCR Circuit)
9. Capacity by De Sauty's method (AC)
10. Determination of L & C by equal voltage method
11. Determination of dielectric constant of liquid
12. Measurement of emf of a thermocouple at various temperatures and verification of any one law of thermoelectric effect

Note

1. Experiments are of four hours' duration
2. Minimum of eight experiments to be performed

Books recommended for Practicals (for Physics Lab-III and Physics Lab-IV):

1. Advanced Practical Physics - Worsnop and Flint
2. Practical Physics - Rajopadhye and Purohit
3. Practical Physics - Hipparagi M.A
4. Practical Physics - Arora
5. Practical Physics - Harnam Singh
6. Practical Physics - Indukumar
7. Practical Physics - Chowhan and singh
8. Advanced course in Practical Physics - D. Chatopadyay & P.C.Rakshit & B.Shaha

B.Sc. Semester-V
(w.e.f. 2013-14)

Optional Subject: Physics

PHY 5.1 : Classical mechanics, Quantum mechanics and Atomic spectra

Unit -1 : Classical Mechanics

Constraints- types, Holonomic, Nonholonomic, Scaleronomic, Rheonomic with examples. Degrees of freedom, space point and configuration space, principle of virtual displacement and virtual work.

Generalized co-ordinates , D 'Alemberts' Principle, Lagrange's equation, simple application to find equation of motion given a lagrangian.(For simple pendulum & Harmonic Oscillator) **07 hrs.**

Problems: **02 hrs.**

Unit-2: Quantum Mechanics:

Introduction to Quantum theory, Compton scattering, expression for Compton shift(with derivation). de Broglie hypothesis, Davison and Germer's experiment. **03hrs**

Problems: **01 hrs.**

Uncertainty principle: Statement, illustration by Gamma ray microscope and diffraction of electrons at a single slit. **02 hrs**

Wave Mechanical Model of the Atom: Setting up of Schrodinger's equation (time independent only). Physical interpretation of wave function, Eigen function and Eigen values. Particle in one-dimensional box (with derivation of expression for energy). Expression for energy in three dimensions, degeneracy; Linear Harmonic oscillator (without derivation for energy); Concept of zero point energy. **07 hrs**

Problems: **01 hrs.**

Statistical Physics

Statistics of identical particles – Maxwell-Boltzmann; Bose-Einstein and Fermi-Dirac statistics. Degenerate Fermi gas. 04 **hrs**

Unit-3: Atomic spectra:

Vector-model of Atom, Spin orbit interaction, Coupling schemes (LS and jj), The Pauli exclusion principle. Electron configuration of single valence electron atoms (Alkali metals) and two valence electron atoms and their spectra (Principal, Sharp, diffuse and fundamental series). , magnetic moment due to orbital and spin motion. Stern-Gerlach Experiment

07hrs

Magnetic field effect on light: Larmor precession, Normal and Anomalous Zeeman effect, Experimental method to study Zeeman effect Expression for Zeeman shift(using quantum theory). Energy level diagram for sodium D lines in a weak magnetic field..

04 hrs

Problems: **01 hrs.**

Reference books:

1. Classical Mechanics(X Ed)- Takwale and Puranik-Tata.McGraw Hill,Newdehli,1989

2. Classical Mechanics(XIV ed)- Gupta,Kumar & Sharma-
3. Classical Mechanics(XVII ed)- Goldstein-Narosa Publishing Newdehli,1998
4. Quantum Mechanics vol 1 and vol 2(I ed)- Shrivatsav-Pragati Prakashan, Meerat,1977
5. Quantum Mechanics- Gupta,Kumar & Sharma- Jayprakashnath &Co,Meerat,2004
6. Quantum Mechanics(I ed)- Powell-Oxford& IBH Publishing,NewDehli,Bombay,Culkatta,1961
7. Quantum Mechanics - Pauling& Wilson
8. Heat & Thermodynamics and Statistical Physics(XVIII-Edition) – Singhal, Agarwal & Satyaprakash – Pragati Prakashan, Meerut, 2006.
9. Modern physics- R. Murugeshan-- S.Chand Publication,New Dehli.
10. Modern physics(I ed)-Duggal and Chopra- Shobhanlal Nagin chand &Co,1989
11. Introduction to modern physics- Ritchmeyer,Kennerd & Lauritser-TMH Publishing NewDehli
12. Perspective of modern physics(VI ed)- A.Baiser- Tata McGraw Hill,Newdehli.2002
13. Modern physics- J.B.Rajam
14. Introduction to atomic spectra(IV ed)- H.E.White- McGraw Hill,Newdehli,2004

PHY 5.2 : Molecular Spectra, Lasers, Relativity and Electronics

Unit -1 : Molecular spectra:

Molecular Motions: different types motions in a molecule (electronic, vibration, rotation), molecular energy distribution in the electromagnetic spectrum, General features of band spectra compared to atomic spectra. The diatomic molecule as a rigid rotator, non rigid rotator, the rotational energy levels and their spectrum. Information about the moment of inertia and inter nuclear distances from the pure rotational spectrum. **05 hrs.**

Lasers: Einsteins theory of spontaneous emission, stimulated emission and stimulated absorption, conditions for laser action, types of lasers : Gas lasers(He-Ne), Diode laser,. Applications of Lasers. **04 hrs**

Raman effect: The Rayleigh's Scattering, the Raman Scattering. Quantum theory of Raman effect and Raman spectrum. Applications of Raman effect: Laser Raman Spectroscopy, SERS (Surface Enhanced Raman Spectroscopy), Comparision of IR and Raman Spectra. **05 hrs**

Problems: 01 hrs.

Unit-2: Relativity

Michelson-Morley experiment, Significance of negative result. Postulates of special theory of relativity. The Lorentz transformation –Relativity of length and time. Law of addition of velocities, variation of mass with velocity and mass-energy relation. **08 hrs**

Problems: 01 hrs.

Unit -3: Electronics-I

Network therems: Current and voltage sources, Thevenin and Norton's Theorems. **03 hrs**

Power Supplies; Power Supplies with filters (C, L, LC and π-section), Qualitative idea of Peak inverse voltage, efficiency, Ripple factor, Zener diode: characteristics and its use in voltage regulation **04hrs**

Transistors : DC h-parameters and their determination, performance of transistor as an amplifier (CE mode only) and its frequency response, Brief explanation of positive and negative feedback. Transistor as an oscillator, Hartley and Phase shift oscillators (Qualitative only); FET: Types, characteristics and parameters. FET as an amplifier (CS mode, qualitative). LDR characteristics. **08 hrs**

Problems **02 hrs**

Reference books:

1. Modern physics- R. Murugeshan-- S.Chand Publication,New Dehli.
2. Modern physics(I ed)-Duggal and Chopra- Shobhanlal Nagin chand &Co,1989
3. Introduction to modern physics- Ritchmeyer,Kennerd & Lauritser-TMH Publishing NewDehli
4. Perspective of modern physics(VI ed)- A.Baiser- Tata McGraw Hill,Newdehli.2002
5. Modern physics- J.B.Rajam
6. Introduction to atomic spectra(IV ed)- H.E.White- McGraw Hill,Newdehli,2004
7. LASERs and Non linear Optics- B.B.Laud
8. Introduction to Relativity- R.Resnik.
9. Relativistic Mechanics- Gupta and Kumar.
10. Basic electronics and solid state physics- B.L.Theraja- S.Chand Publication,New Dehli
11. Basic Electronics- B.L.Theraja- S.Chand Publication,New Dehli
12. Integrated Electroniics- Millmans Ans Halkias-McGraw Hill,Newdehli
13. Electronic devices and circuits- Allan Mottersed-.McGraw Hill,Newdehli
14. Basic Electronics linear circuits,TTTI- Bhargav&etal-Bharat Book Prakashan Dharwad

PHY 5.3 : Physics Lab –V

List of experiments:

1. Fraunhofer lines and determination of Rydberg constant
2. Ionisation potential of Xenon/Mercury
3. Thevenin and Norton's theorems using ladder circuits
4. Low pass filter
5. Characteristics of Zener diode
6. Voltage regulator using Zener diode
7. Battery charger
8. Battery eliminator
9. CE- amplifier
10. Hybrid parameters

11. FET characteristics

Note:

1. Experiments are of four hours' duration
2. Minimum of seven experiments to be performed

PHY 5.4 : Physics Lab –VI

List of experiments:

1. Analysis of molecular spectra (Rotational spectra)
2. Study of hydrogen spectrum - determination of Rydberg constant
3. Planck's constant using Photo cell
4. Thevenin and Norton's theorems using Wheatstone's net
5. High pass filter
6. Construction of multi range voltmeter
7. Full wave bridge rectifier with π-section filter
8. Hartely Oscillator
9. Colpits Oscillator.
10. FET Amplifier
11. Photoconductive cell (LDR)

Note:

1. Experiments are of four hours' duration
2. Minimum of seven experiments to be performed

B.Sc. Semester-VI
(w.e.f. 2012-13)

Optional Subject: Physics

PHY 6.1: Solid state physics, Nuclear physics, and Nanoscience

Unit -1 : Solid state Physics:

Crystal structure: Lattice, lattice translational vectors, basis of crystal structure, Types of unit cells, Co-ordination numbers, Bravais lattices, Seven crystal Systems, Miller indices, expression for inter-planar spacing, crystal structure of NaCl and CsCl. **03 hrs**

Problems: **01 hrs.**

Crystal diffraction: X-ray spectrum(Continuous & Characteristic), Bragg's law, Bragg's X-ray spectrometer. **02hrs**

Problems: **01 hrs.**

Specific heat of solids: Experimental facts; classical theory, Einstein's and Debye's theory of lattice specific heats. **03 hrs**

Free electron theory of metals: Classical free electron model, expressions for electrical and thermal conductivity, Wiedemann-Franz law, failure of classical free electron theory. **02 hrs**

Semiconductors :Expression for electrical conductivity in case of intrinsic semiconductors, experimental determination of energy gap, Hall effect, expressions for Hall co-efficient and applications. **03 hrs**

Unit-2:

Magnetic materials : Classification, classical Langevin's theory of diamagnetism and paramagnetism, determination of paramagnetic susceptibility by Gouy's method. Ferromagnetism, Domain and hystresis. **03 hrs**

Superconductivity : Experimental survey , Occurrence of superconductivity, destruction of superconductivity by magnetic field, Meissner effect, isotope effect and applications. **02 hrs**

Nanoscience:

Introduction, size effect, correlation with quantum mechanical 'particle in a box' problem; quantum structures: quantum wells, wires and dots; nanomaterials; synthesis, characterization, properties and applications (qualitative). **05 hrs**

Unit- 3 : Nuclear Physics:

α-rays: Theory of α-decay, Range, ionization, specific ionization and Geiger-Nuttal relation, **03hrs.**

Problems: **01 hrs.**

β-rays: Fermi theory of β-ray spectrum. **02 hrs**

Nuclear models: Liquid-drop model — explanation of semi-emperical mass formula, explanation of nuclear fission on the basis of liquid-drop model. Shell model (qualitative), Magic numbers. **02 hrs**

Nuclear forces: Properties of nuclear forces, Meson Theory of nuclear forces. **01 hr**

Nuclear reaction: Q-value and Types of nuclear reactions. **01 hr**

Detectors and Accelerators: GM counter, Scintillation counter, linear accelerators, Cyclotron. **03 hrs**

Elementary particles: classification **01hrs**
Problems: **01 hrs.**

Reference books:

1. Solid State Physics- C.Kittel-Wishey Publishing
2. Solid state physics(I ed)- A.J.Dekkar-McMillan,NewDehli,2003
3. Solid state physics(I ed)- Keer-New age international Pvt. Limited.2002
4. Solid state physics- Kumar And Gupta
5. Solid state physics- Kumar and Gupta and Saxena
6. Nano: The Essentials- T.Pradeep(TMH,New Dehli,2007
7. Nanotechnology: Principles & practices- S.K.Kulkarni
8. Introduction to Nanotechnology- C.P.Poole&F.J.Owens
9. Nuclear Physics(XVIII ed)-I .Kaplan-Addison&Wesley Publishing Company.1977
10. Nuclear Physics(IV ed)- D.C.Tayal-Himalaya Publishing House,1982
11. Fundamentals of Nuclear Spectroscopy- Basswell- Tata McGraw Hill,Newdehli,2004
12. Nuclear physics- I.Kaplan

PHY 6.2: Astrophysics, Computational physics, Electronics and communication

Unit -1 : Astrophysics

Units of stellar distances: light year and parsec; luminosities of stars, apparent and absolute magnitudes, examples; stellar spectra, H-R diagram, binary stars, stellar masses, stellar temperatures, equations of stellar structure, linear density model for stars, formation and evolution of stars (qualitative); end stages of stars – white dwarfs, neutron stars and black holes (qualitative).

Different types of telescopes and their characteristics. **10 hrs**
Problems **01 hr**

Unit -2 : Computational Physics

C-Programming: Introduction; constants, variables and data types. Operators and expressions; I/O operations: scanf, printf; decision making: if-else statement, for and do-while looping. Application to simple pendulum **08 hrs**

Solving physical problems using matrix method: Refractive index, electrical conductivity and tunneling (α decay) **02 hrs**

Unit -3 : Electronics-II

Integrated Circuits (ICs): types of ICs, operation of astable multivibrator using 555-timer (qualitative); Op-amp, characteristics. **03 hrs**

Unit-4 Digital Electronics

Number systems: Decimal, Binary, Hexadecimal and their interconversion. Boolean algebra, truth tables, basic theorems, Basic and Universal gates. DTL gates; OR, AND, NOT, NAND and XOR gates. **04 hrs**
Problems **01 hr**
Electronics communication

Filters ;Low pass and high pass constant K–type filter , classification of radio waves; Types of radio wave propagation, radio waves propagation through ionosphere. Critical frequency, critical angle, MUF, virtual height, secant law. **05 hrs**

Modulation and Demodulation : Need of modulation, types of modulation, significance of modulation index, Frequency spectrum of AM., AM modulator using BJT.

Frequency Modulation (FM) : FM spectrum, FM transmitter, applications of FM, Comparison between FM & AM **.**

Demodulation : Necessity, AM detection, square law detector (qualitative). Super heterodyne receiver (Block diagram).

05 hrs.

Problems **01 hr**

Reference books:

1. Introduction to Astrophysics(XV ed)- Baidyanath Basu-Prantice Hall of India-2006.
2. Astrophysics(III ed)- K.D.Abhyankar-Universities Press India Pvt. Ltd. 2009.
3. Introduction to Astrophysics and Astronomy- M. Zeilik, Gregory and Smith.
4. Basics of computer- Rajesh Hongal.
5. C Programming - E. Balguruswamy.
6. C programming- Kotur.
7. Modern Physics- Murugeshan.
8. Moden Physics- Duggal and Chabra.
9. Basic electronics and solid state physics- B.L.Theraja- S.Chand Publication,New Dehli
10. Basic Electronics- B.L.Theraja- S.Chand Publication,New Dehli
11. Integrated Electroniics- Millmans Ans Halkias-McGraw Hill,Newdehli
12. Electronic devices and circuits- Allan Mottersed-.McGraw Hill,Newdehli
13. Basic Electronics linear circuits,TTTI- Bhargav&etal-Bharat Book Prakashan Dharwad
14. Electronics communication system- Kennedy & Davis.

PHY 6.3 : Physics Lab –VII

List of experiments:

1. Analysis of x-ray diffraction spectra
2. Electrical and thermal conductivity of copper to determine Lorenz number.
3. Hall effect
4. Determination of resistivity of a semiconductor by four probe method.
5. Characteristics of GM counter.
6. GM tube (dead time).
7. Voltage Multipliers using diodes and capacitors.
8. V-I Characteristics of three LED's (emitting different colors).
9. Study of DTL gates.
10. Use of IC 7400 (basic gates)
11. Solar cell characteristics (a) Open circuit voltage (b) Short circuit current.

Note:

1. Experiments are of four hours' duration
2. Minimum of seven experiments to be performed

PHY 6.4 : Physics Lab –VIII

List of experiments:

1. Thermistor.
2. BH curve
3. Verification of inverse square law using GM tube
4. Attenuation of β- radiation (absorption coefficient of aluminium)
5. Spectral sensitivity of photovoltaic cell.
6. H.R. diagram : Physical Properties of stars
7. Use of IC 7400 (D'Morgan's theorems & verification of Boolean expressions).
8. Phase shift Oscillator using Op Amp.
9. Astable Multivibrator (using 555 timer).
10. Weins bridge oscillator using Op-amp.
11. Executing C Programs for period of a simple pendulum and range & height of a projectile.

Note:

1. Experiments are of four hours' duration
2. Minimum of seven experiments to be performed

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Karnataka University, Dharwad
Revised B.Sc Syllabus in ELECTRONICS
Scheme and Structure of the syllabus

		No. of Hrs/week /paper		Examination marks/paper		Duration of Exam.		Total marks/paper
Semester Scheme	Title of the paper	Th.	Pr.	Th/Pr	I.A	Th.	Pr	
Sem I	ELE 1.1: Basic Electronics :	5	-	80	20	3	-	100
	ELE 1.2: Electronics Lab-I	-	4	40	10	-	4	50
Sem II	ELE.2.1 Amplifiers and Oscillators:	5	-	80	20	3	-	100
	ELE 2.2: Electronics Lab-II	-	4	40	10	-	4	50
Sem III	ELE 3.1: Opto and Digital Electronics	5	-	80	20	3	-	100
	ELE 3.2: Electronics Lab-III	-	4	40	10	-	4	50
Sem IV	ELE 4.1: Operational Amplifiers, Active filters and LT	5	-	80	20	3	-	100
	ELE 4.2: Electronics Lab-IV	-	4	40	10	-	4	50
Sem V	ELE 5.1. Communication-I;	6	-	80	20	3	-	100
	ELE 5.2. Microprocessor and Microcontroller;	6	-	80	20	3	-	100
	ELE 5.3: Electronics Lab-V	-	4	40	10	-	4	50
	ELE 5.4: Electronics Lab-VI	-	4	40	10	-	4	50
Sem VI	ELE 6.1. Communication-II;	6	-	80	20	3	-	100
	ELE 6.2. Computer Concepts and C Programming	6	-	80	20	3	-	100
	ELE 6.3: Electronics Lab-VII	-	4	40	10	-	4	50
	ELE 6.4: Electronics Lab-VIII	-	4	40	10	-	4	50

Karnataka University, Dharwad
Revised B.Sc. Syllabus in ELECTRONICS

I Semester

ELE 1: Basic Electronics :

Unit 1: Network Analysis;

Review of passive components. Concepts of voltage and current sources, KCL and KVL statements. Circuit analysis by Mesh and Node methods for D.C. Network. Theorems: Thevenin's, Norton's, Maximum power transfer, Millman,s, Superposition and reciprocity theorems (Statement, proof, Simple Numerical examples applicable to DC only). **12Hrs**

Unit 2: Semiconductor Diode and Rectifiers;

Review of band structure and P and N type semiconductors. Introduction; diode characteristics, diode switch characteristics, breakdown mechanism (Avalanche and Zener). Zener diode characteristics, Half wave, Full wave and bridge rectifiers- Ripple factor, Efficiency, PIV, TUF(With Derivation).

Filters; Capacitor input, inductor input and π -Section filters.

12 Hrs

Unit 3: Regulated Power Supply;

Concept of voltage regulation, unregulated and regulated power supply. Dual power supply, block diagram of regulated power supply, line and load regulation, stability factor. Zener diode as a voltage regulator, concept of IC, IC regulation (block diagram with three terminal 78xx). **10 Hrs**

Unit 4: Measuring Instruments:

Principle of Voltmeter, Multirange Voltmeter (AC and DC), loading effect.Principle of Ammeter, Multirange Ammeter (AC and DC)Principle of Ohmeter, series and shunt type ohmmeter. Multimeters: Analog and Digital multimeter, basic concepts with block diagram, and uses. CRO-Use of CRO (frequency, Voltage ,Phase, Lissajious pattern).

12 Hrs

Unit 5: Transistor and Biasing Circuits;

Introduction, types of transistors and working. Configurations; CE,CB and CC. Relation between $\propto, \beta \text{ and } \gamma$. Study of CE-Characteristics, different regions, dc load line, selection of operating point, need for stabilization, stability factor, thermal runaway, thermal resistance. Different Biasing Circuits; fixed bias, collector to base bias, emitter bias or self bias and voltage divider bias. **14 Hrs**

Reference Books:

1) Electronic Devices and Circuit theory. --- Robert Boylstead
2) Basic electronics and Linear circuits. --- N.N.Bhargav, Kulashastra. TTTI Publications
3) Electronic devices -- David Bell.
4) Network Analysis. --- G.K.Mitthal
5) Basic Electronics.--- B.L.Theraj
6) Principles of Electronics --- Malvino.
7) Devices and Circuits --- Allen Mottorshed.
8) Principles of Electronics. --- V.K.Mehta.
9) Network Analysis. –Van Valkenburg

10) Instrumentation---A.K.Sawni
11) Circuits and networks. Analysis and synthesis—A Sudhakar and S P Shyamohan
12) Principles of electronics-B.V.N.Rao

ELE 1.Practicals

1. VI-Characteristics of semiconductor diode.
2. VI-Characteristics of Zener diode.
3. Verification of Thevinin's and Norton's theorem (Ladder Network).
4. Maximum power transfer theorem.
5. Superposition theorem.
6. Full wave rectifier with L and C filter.
7. Fullwave bridge rectifier.
8. Zener diode as voltage regulator and comparison with IC 78xx.
9. Transistor characteristics (CE), dc h-parameters.
10. Transistor biasing (Emitter bias and voltage divider bias).
11. Construction of Multirange Voltmeter/ Multirange Ammeter.
12. Use of CRO (determination of frequency and amplitude)

Note: 1. Minimum of 08 experiments to be performed.
2. Practical is of four hours duration.

B.Sc II Semester

ELE.2 Amplifiers and Oscillators:

Unit 1: Network Parameters:

Two Ports Network (definition) Z, Y and h-parameters, relation between parameter sets. Transmission parameters (ABCD-Parameters) and their inter conversions interms of Z and Y parameters. Concept of T and π networks. Network transformations (T to π and vice-versa) and their characteristics impedances. Solve sufficient problems

12 Hrs

Unit 2: Passive Filters:

Filter definition, basic theory of filters, types of filters, low pass filter, high pass filter, band pass filter and band elimination filter, constant k-type filters design and derivation. Solve sufficient problems.

12 Hrs

Unit 3: Amplifiers:

Classifications of amplifiers, analysis of a transistor CE, CB and CC amplifier circuits using h-model, single stage and two stage RC coupled CE amplifier. Design of CE amplifier, effect of various components on frequency response. Solve sufficient problems. **10 Hrs**

Unit 4: FET and Amplifiers;

Introduction, FET types, JFET-Construction, working, characteristics, parameters and their relationships, MOSFET-Types, construction, working and characteristics. JFET amplifier; CS mode, operation and expression mode for gain A . Comparision between Bipolar transistor and JFET. Comparision of JFET and MOSFET. Complementary MOS (CMOS). Solve sufficient problems

12 Hrs

Unit 5: Feedback and Oscillators;

Concept of feedback; positive and negative feedback, gain of negative feedback amplifier, advantages of negative feedback amplifier. Oscillators (definition) Barkhausen Criterian for oscillation, types of oscillators; Colpitt's, Hortly, Phase shift, Wein bridge and Crystal Oscilator (Construction, working and expression for frequency of oscillation). Multivibrators; definition, classification of multivibrators, astable,monostable and bistable multivibrators. Solve sufficient problems

14 Hrs

Reference Books:

1) Network lines and fields . --- Reyder
2) Integrated Electronics. --- Millman and Halkies.
3) Electronic Devices and circuit. --- A. Mottershed.
4) Hand book of Electronics. --- Gupta and Kumar.
5) Basic Electronics. --- B.L.Theraj
6) Electronic Devices. -- D.Bell
7) Basic Electronics and Linear Circuits.--- N.N.Bhargav, Kulashastra. TTTI Publications
8) Basic Electronics. --- Bagde and Sinha.
9) Principles of Electronics. --- V.K.Mehta.
10) Electronic fundamental and applications—Rao and Choudhari New age international Publication.

ELE.2 practicals:

1. h- Parameters for a two port network using registers.
2. Constant K type low pass filter
3. Constant K type High pass filter
4. Single stage RC coupled amplifier
5. Two stage RC coupled amplifier
6. Study of FET static characteristic
7. FET common source amplifier
8. FET source follower
9. Study of transistor Phase Shift oscillator
10. Study of transistor Wein Bridge oscillator
11. Study of transistor Hortley/Collpitts oscillator
12. Study of transistor astable multivibrator/ monostable multivibrator

NOTE: 1.Minimum of 8 experiments to be performed.
2. Practical is of four hour durations.

B.Sc III Semester

ELE 3: Opto and Digital Electronics

Unit 1: Opto Electronics:

Introduction, spectral response of human eye, construction, working characteristics of LED. Photo diode, photo transistor, photomultiplier tube, photovoltaic cell, photoconductive cell and solar cell and their applications. Solve sufficient problems.

10 Hrs

Unit 2: Number Systems:

Binary number system, converting binary to decimal and vice versa, binary addition and subtraction (1's and 2's complement method). Hexadecimal number system, converting Binary to Hexadecimal and vice versa. Hexadecimal to decimal and vice versa, Octal to decimal conversion and vice versa. Octal to Binary conversion and vice versa. BCD(BCD 8421) and Gray code conversion between Binary and Gray code. Use of XOR gate for gray to binary and vice versa. ASCII code. Solve sufficient problems

12 Hrs

Unit 3: Boolean Algebra:

Boolean algebra, logic gates; basic logic gates-AND, NOT, OR, logic symbol and truth table .Positive and Negative logic. Boolean laws, DeMorgan's theorems, simplification of Boolean expressions-SOP and POS. Derived logic gates (NAND, NOR, XOR and XNOR). Universal property of NOR and NAND gates. K-map-3 and 4 variable expressions. Pulse characteristics. Logic families-classification of digital IC's, characteristics of logic families. Circuit description of TTL NAND gate with totem pole and open collector. TTL sub families. Circuit description of CMOS inverter, comparison of TTL and CMOS families. Solve sufficient problems. **12 Hrs**

Unit 4: Combinational Logic Circuits:

Combinational logic circuits;Half adder,Full adder,Half subtractor,Full subtractor.Two bit comparator,encoder,decimal to BCD Priority encoder,decoder 2:4 using AND gates 3:8 using NAND gates, BCD to decimal decoder and BCD to 7 segment decoder. Multiplexer (4:1 using gates) and demultiplexer (1:4 using gates). D/A conversion using 4 bit binary weighted resistor circuit and working. Circuit of R-2R ladder-concept only. Solve sufficient problems. A/D conversion; characteristics, successive approximation ADC (mention the relevant IC's for all).

13 Hrs

Unit 5: Sequential Logic Circuits: RS latch, NAND and NOR latches, Flip-flops, clocked RS flip-flops, D flip-flop and edge triggered JKFF, TFF, Edge triggered, Master –Slave, JKFF, Clear and preset inputs. Registers and counters-4-bit serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out and applications. Ring Counter, Johnson counter and their applications. A synchronous counters-logic diagram, truth table and timing diagram of 3-bit ripple counter, 3-bit up-down asynchronous counter and modified asynchronous counters. Solve sufficient problems.

13 Hrs

Reference Books:

1) Modern Digital Electronics. --- R.P.Jain
2) Digital Fundamental. --- Floyd.
3) Digital Principles and Applications. --- Malvino and Leech
4) Digital Logic and Computer Design. --- M.Morris Manu
5) Digital Electronics. ---Thomas Bharti
6) Electronic fundamental and applications—Rao and Choudhari New age international Publication
7) Electronic devices. -- David Bell.
8) Principles of Electronics.--- V.K.Mehta.
9) Principles of Electronics.---B.V.N.Rao

ELE 3. practicals:

1. VI-characteristics of LDR/LED
2. VI-characteristics of Phototransistor
3. VI-characteristics of photovoltaic Cell
4. Binary to gray conversion and vice versa using XOR gate
5. Realisation of Basic gates using NAND gate (IC 7400)
6. Characteristics of logic gates: 7400, 7402, 7404,7406, and 7432
7. Verification of DeMorgans Theorems using basic gates.
8. Half adder and full adder
9. Half substractor and full substractor
10. JK flip-flop using 7476
11. Shift resistors-SISO and SIPO
12. 4-bit ripple counter-7476 and conversion to decade counter

NOTE: 1.Minimum of 8 experiments to be performed.
2. Practical is of four hour durations.

B.Sc IV semester

ELE 4: Operational Amplifiers, Active filters and LT

UNIT-1 Operational Amplifier:

Differential amplifiers, 4 types of differential amplifiers (qualitative) operational amplifiers block diagram, equivalent circuit, ideal op-amp characteristics, virtual ground, operational amplifier parameters: input bias current, input offset voltage, output offset voltage, input offset current, input and output resistance, CMRR, slew-rate, open loop gain in inverting and non inverting mode, operational amplifier with negative feedback, voltage series feedback (non inverting) and voltage shunt feedback (inverting) circuits, derivation of voltage gain, input resistance, output resistance and bandwidth.

12 Hrs

UNIT-2: Application of Operational Amplifier: A.C. amplifier, peaking amplifier, summing, scaling and averaging amplifier, instrumentation amplifier, current to voltage convertor and vice versa. Low voltage DC voltmeter, Integrator, differentiator, qualitative study of operational amplifier as comparator. Astable, Monostable, multivibrator circuits and Weinbridge oscillator circuit, (Design and working)

12 Hrs

UNIT-3: Active Filters and Applications of IC 555 timer: Important of Active filters first order Butterworth: Low pass, high pass, band pass and band elimination filters, all pass filters (Expression for cutoff frequency and pass band gain). IC timer 555: structure and working (Block diagram). Astable, Monostable Multivibrators and schimitt trigger using timer 555. **12 Hrs**

UNIT-4: Laplace Transformation: singularity and its LT properties of Laplace Transformation (Linearity, scale changing, differentiation, Integration and initial and final value theorems). Inverse Laplace transform. Method of residues, heavy side formula. Application of LT, to solve simple differential equations and electrical network problems. Driving point functions, transform functions and properties of network functions. Study of poles and zeros. **12 Hrs**

UNIT-4: Network Synthesis: Introduction, positive real functions, conditional test for positive real functions, properties of positive real functions, Hurwitz polynomials and elementary synthesis procedure for LC and RC network with use of Fosters and cauers type of realization. **12 Hrs**

Reference Books:

1) Operational and Linear Integrated Circuits. --- R.A.Gayakwad (PHI)
2) Linear Integrated Circuits. --- D. Roy choudary and S.Jain
3) Operational Amplifier and Linear integrated Circuits. --- Coughlin and Drischoll
4) Network Analysis. --- M.E. Volkenberg.
5) Network Synthesis. ---- M.E. Volkenberg.
6) Engineering Mathematics. ---- B.S.Grewal.
7) Electronic fundamental and applications—Rao and Choudhari New age international Publication
8) Circuits and networks. Analysis and synthesis—A Sudhakar and S P Shyamohan

ELE 4. practicals:

1. Op-amp as ac and dc inverting amplifier
2. Non inverting op-amp using ac and dc
3. Op-amp as an adder and substractor
4. Op-amp as an integrator and differentiator
5. Op-amp as astable/monostable multivibrator
6. Op-amp as Wein bridge oscillator

7. Op-amp as a dc voltmeter
8. Astable multivibrator using IC 555 timer
9. Monostable multivibrator using IC 555 timer
10. Study of ploes and zeros
11. Instrumentation amplifier using op-amp
12. Active low pass /High pass filter

NOTE: 1.Minimum of 8 experiments to be performed.
2. Practical is of four hour durations.

B.Sc. V Semester

ELE 5.1. Communication-I;

Unit 1: Power Electronics:

SCR,DIAC and TRIAC (Construction, working and their characteristics) applications, SCR as a half wave rectifier and power control device, DIAC as a lamp dimmer and TRIAC as an electronic switch, UJT construction, working and characteristics, UJT as a relaxation oscillator(expression for frequency of oscillation).

10 Hrs

Unit 2: Modulation and Demodulation: Ionosphere propagation of EM waves through Ionosphere, skip-distance, maximum usable frequency, virtual height and critical frequency, critical angle and fading. Modulation; need for modulation, types of modulation; AM,FM and PM. Amplitude modulation representation modulation index, expression for instantaneous voltage, side bands, power relation. AM collector modulator. FM-definition, modulation index, expression for FM frequency spectrum, deviation ratio, FM side bands, Demodulator; Diode AM detector, transistor AM detector, FM detector, balanced sloop detector, Foster see lay discriminator and ratio detector. Solve sufficient problems.

12 Hrs

Unit 3: Transmitters and Receivers:

Block diagram of AM and FM Transmitter (Qualitative explanation) characteristics of radio receiver; sensitivity, selectivity, fidelity, signal to noise ratio, noise figure and stability. AM receivers; straight radio receiver and Super heterodyne receiver(explanation of each block diagram). Image frequency, intermediate frequency and its choice. Block diagram of FM Super heterodyne receiver, comparison of AM and FM. Solve sufficient problems. **10 Hrs**

Unit 4: Antenna:

Radiation mechanism, wire radiators in space-Resonant Antenna s-radiation pattern and current distribution for different lengths, non resonant antenna, antenna parameters-gain, directive gain, power gain, bandwidth, beam width, polarization, efficiency, radiation resistance, total effective resistance. Derivation for the expression of radiation resistance and power radiated by antenna (qualitative), ungrounded and grounded antennas, effect of antenna height. Antenna couplers, dipole arrays, folded dipole, Yagi-antenna. Qualitative study of helical antenna, loop antenna, parabolic reflector, Horn antenna and Micro strip antenna. Solve sufficient problems **10 Hrs**

Reference Books:

1) Electronic Communication. --- Roddy and J. Coolean
2) Electronic Communication System. --- G.Kannedy.
3) Radio Engineering. --- G.K.Mitthal
4) Electronic Communication. --- G.Gupta
5) Communication. ---- Grob
6) Electronic fundamental and applications—Rao and Choudhari New age international Publication
7) Principles of Electronics.--- V.K.Mehta.
8) Principles of Electronics.---B.V.N.Rao
9) Electronic Devices and circuit. --- A. Mottershed.
10) Communication electronics N.D.Dehapande and D.A.Deshpande

ELE 5.1. practicals:

1. UJT characteristics
2. SCR characteristics
3. SCR as a power control device
4. UJT as a relaxation oscillator
5. Amplitude Modulation
6. Diode as a detector
7. Frequency modulation and demodulation
8. Diode as a clipping circuit (un biased and biased)
9. Diode as a clamping circuit (un biased and biased)
10. Straight radio receiver
11. Selectivity of radio receiver

NOTE: 1.Minimum of 7 experiments to be performed.
2. Practical is of four hour durations.

B.Sc. V Semester

ELE 5.2. Microprocessor and Microcontroller;

UNIT 1: Microprocessor: Introduction**,** Basic block diagram of MP, speed, word size, memory capacity, classification of MP, MP 8085, features, architecture, block diagram, internal registers, registers pairs, flags, stack pointer, program counter, types of buses, multiplexed address and data bus, generation of control signals, pin description of 8085, operation codes, operands and mnemonics, instructions set of 8085, instruction classification, instruction format, addressing mode, data transfer instruction, arithmetic instruction, incremental and decrement instruction, logical instruction, branch instructions and stack input/output and machine control instructions. Solve sufficient problems **12 Hrs**

UNIT 2: Stack Operations and Programming: Stack operations, sub routine calls and return operations, delay loops, use of counters, timing diagrams, instruction cycles machine cycle, T-states, time delay, numerical examples, program for data transfer and memory operation (Direct indirect addressing). Addition and Subtraction of 8-bit and 16-bit numbers, multiplication and division of 8-bit numbers, display of smallest/largest number in a giver array of numbers, sorting of numbers in ascending/descending order. Number of 1's and 0's in given byte, 1's and 2's compliment, program to add 2N byte numbers, program to generate Fibonacci series up to the limit, program to find the factorial of number. **10 Hrs**

UNIT 3: Interfacing : I/O instruction and interrupts in 8085 basic interfacing concepts compatible ICs of MP 8085, data transfer, and synchronous I/O data transfer using interrupts, memory interfacing-address decoding, interfacing RAM and ROM interfacing I/O-input port, output port, IN and OUT instructions, programmable internal timer 8253 and DA converter using 8085 and operation amplifier programmable peripheral interface, IC 8255, features, pin diagram functional block diagram, diagram ports and their model. Solve sufficient problems **10 Hrs**

UNIT 4: Microcontroller: M.P 8051 introduction; Basic block diagram, comparison of MC with MP, comparison of 8-bit, 16-bit and 32-bit MC, overview of 8051, CPU, 8051 addressing mode, external addressing, interrupts, 8051 instruction execution, 8051 instruction set- data moment instructions, arithmetic instructions, bit operators, execution change operators, ALP type and examples.

10 Hrs

Reference Books:

1) Microprocessor and Microcomputers. ---- B.Ram
2) Microprocessor architecture, programming and applications. ---- Gaonkar.R.
3) Introduction to Microprocessor. --- A.P.Mathur.
4) Microprocessor and Interfacing, programming and hardware. ----Douglas Hall
5) Microprocessor and Microcontroller. --- B.P.Singh (Galgotia- Publications)
6) 8051 Microcontroller Architecture, programming and application. ---- Kenneth Ayala
7) 8051 Microcontroller and embedded systems—M.A.Mazadi and J.G .Mazadi

ELE 5.2. practicals:

1. Register to register movement
2. Register to memory movement
3. Addition and Subtraction of 8-bit numbers
4. Addition and Subtraction of 16-bit number
5. Multiplication of two 8-bit numbers
6. Largest of two numbers
7. 1's and 2's complement

8. Find the square root of number
9. Arraigning an array of numbers in ascending/descending order
10. Interfacing seven segment display
11. Interfacing card to convert digital input to equivalent analog output (suggested to use IC DAC 08 and IC 741)

NOTE: 1.Minimum of 7 experiments to be performed.

2. Practical is of four hour durations.

B.Sc. VI Semester

ELE 6.1. Communication-II;

Unit 1: Transmission Lines and OFC;

Transmission lines; introduction, different types of transmission lines(parallel and coaxial lines) currents and voltage relation on RF transmission line, definition ESWR and reflection coefficient OFC; introduction, block diagram of optical fiber system, advantages, fiber optic cables, light propagation through fiber, expression for numerical aperture. Types of light sources and detectors, losses in optical fiber (Qualitative). Solve sufficient problems **12 Hrs**

UNIT 2: Television Receivers:

Introduction, scanning, interlaced scanning, TV camera, composite video signal – Blanking and Synchronizing pulses, vestigial side band transmission. TV systems and standards. Comparison between American and European systems. Block diagram of Monochrome TV receiver (Explain function of each block). Basic principles of colour TV, primary and secondary colours , Three colour theory -Grassmann's Law. Colour TV receivers. Solve sufficient problems **10 Hrs**

Unit 3: Satellite and Mobile Communication: Introduction, Satellite orbits, satellite links, path laws, Block diagram of satellite subsystem uplink, downlink, cross link, transponders (C- band) ground station(simplified block diagram of earth station) multiple access method TDMA, FDMA, CDMA (qualitative analysis) Basic telephone, cellular phone, operation, PCS systems, LAN, WAP, protocol, architecture (Block diagram) of cellular mobile communication system. **10 Hrs**

Unit 4: Pulse and Digital Communication Systems:

Introduction –sampling theorem, types PAM-PWM, PPM, PCM. Quantization. Digital communication system –introduction, basic block diagram of a digital communication system, digital modulation-FSK, PSK and ASK. Advantages and disadvantages of digital transmission, application, characteristics of data transmission system. Comparison of modulation technique. Solve sufficient problems

12 Hrs

Reference Books:

1) Microwave. ---- K.C. Gupta.
2) Optical Fiber Communication. --- Gerd Keyser
3) Monochrome and Colour TV—R.R.Gulati
4) Basic Television and video system—Grob and Hernden
5) Microwave. ---- K.C. Gupta.
6) Optical Fiber Communication. --- Gerd Keyser
7) Digital communication-- Taub and Schilling
8) Digital communication-Ronald J Tosi
9) Analog and Digital communication- Simon Haykin

ELE 6.1. practicals:

1. Numerical aperture of OFC
2. Characteristics of OFC
3. Bending losses in OFC
4. Frequency response of Loudspeaker
5. Impedance characteristics of a microphone
6. Pulse width modulation (pwm) and demodulation
7. Pulse Position Modulation (ppm) and demodulation
8. Pulse amplitude /Pulse code modulation and demodulation
9. Frequency/ Phase shift keying

10. Amplitude shift keying
11. Verification of Sampling theorem

NOTE: 1.Minimum of 7 experiments to be performed.
2. Practical is of four hour durations.

B.Sc. VI Semester

ELE 6.2. Computer Concepts and C Programming;

Unit 1: Computer Concepts: Introduction to computer system logic organization. Neumann concept of computer system, block diagram of computer system, Central Processing Unit(CPU), ALU, CU, Main memory, Input Output unit, Brief introduction of history of computer generations.
Hardware: Input devices-Key board, Mouse, Light pen, Joystick, Scanner, Digitizer, Output Devices: Various types of printers, Plotters, Secondary storage devices- Floppy disk, CD ROM, Optical disk. Software: System software, Operating system, Application software, Machine level language, Assembly language, higher level programming languages, Assemblers, Compilers and editors. Computer programming: Basic programming concepts-Algorithm, flowcharts, Modular programming and structured programming. **10 Hrs**

Unit 2: Introduction to C programming: Importance of C, basic structure of C programming style, execution of C program, C tokens, Keywords and identifiers, constants, variables and data types, declaration of variables, assigning value to variables, defining symbolic constants. Operators and Expressions (All types) . Solve sufficient problems **10 Hrs**

Unit 3: Decision Making, Branching and Looping:
Decision making with IF statement, IF ELSE statement, nested IF, the switch statement, the "?" operator, the GOTO, WHILE DO and FOR statements. Arrays: one and two dimension arrays, initializing of arrays, Multidimensional arrays, Declaring and initialising string variables, reading and writing of strings, reading and writing string, Arithmetic operators, String handling functions. . Solve sufficient problems
12 Hrs

Unit 4: Functions and Pointers:
Function definition, arguments and parameters, local and global variable, Function declaration. Understanding pointers, accessing the address of the variables, declaring and initializing pointers, accessing the variables through its pointer. . Solve sufficient problems **10 Hrs**

Reference Books:
Fundamantals of computers - V.Rajaramanna
Computer concepts and C programming—P.B.Kotur
Programming in ANSI – Balaguruswami
Programming in C –V.Rajaramanna
Let Us C—Yashavat Kanetkar
Computer concepts and C language—By Rajesh Hongal
ANSI C Programming—Ramkumar and Rakesh Aggraval

ELE 6.2. practicals:

1. Write a c-program to find the largest of three numbers
2. Write a c-program to find the leap year
3. Write a c-program to find the roots of quadratic equation
4. Write a c-program to find the area of triangle
5. Write a c-program to generate and print first N Fibonacci numbers
6. Write a c-program to read two matrices and perform addition and subtraction
7. Write a c-program to perform multiplication of two matrices
8. Write a c-program to find to compute the sum of even numbers and the sum of odd numbers using function
9. Write a c-program to find the factorial of a given number.
10. Write a c-program to find whether a given number is prime number or not
11. Write a c-program to accept two numbers and determine the largest of them using functions

NOTE: 1.Minimum of 7 experiments to be performed.
2. Practical is of four hour durations.

Question Paper Pattern

I/II/III/IV Semester M.Sc (CBCS) Degree Examination,_____ 201 _____

(New Scheme)

PHYSICS

Paper: PHCT : _____ Title : _____

Time: 3 Hours (Max Marks: 75)

Answer all questions. Question 9 is compulsory

1.	a)	15 Marks
	b)	
	OR	
2.	a)	15 Marks
	b)	
3.	a)	15 Marks
	b)	
	OR	
4.	a)	15 Marks
	b)	
5.	a)	15 Marks
	b)	
	OR	
6.	a)	15 Marks
	b)	
7.	a)	15 Marks
	b)	
	OR	
8.	a)	15 Marks
	b)	
9.	Answer any three of the following	5 X 3
	a)	
	b)	
	c)	
	d)	

PROFESSOR & CHAIRMAN
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