Appendix to UO No. Acad/C2/4180/2011(1) dated 28-06-2012

K A N N U R U N I V E R S I T Y

SYLLABUS

AND

SCHEME OF EXAMINATION

FOR

UNDERGRADUATE PROGRAMME

IN

P H Y S I C S

CHOICE BASED CREDIT AND SEMESTER SYSTEM

With effect from 2012 admissions

COURSE STRUCTURE FOR UG PROGRAMME
PHYSICS
Semester I

No.	Course Title	Hrs/ wk	Hrs /Sem	Credit
1	Common Course I English	5	90	4
2	Common Course II English	4	72	3
3	Common Course VII Second Language	4	72	4
4	Core I –Methodology of Science	2	36	2
5	Core Practical I	2	36	--
6	Complementary I (Course I)	4	72	*
7	Complementary II (Course I)	4	72	*

Semester II

No.	Course Title	Hrs/ wk	Hrs /Sem	Credit
1	Common Course III English	5	90	4
2	Common Course IV English	4	72	3
3	Common Course VIII Second Language	4	72	4
4	Core II – Informatics	2	36	2
5	Core Practical I	2	36	--
6	Complementary I (Course II)	4	72	*
7	Complementary II (Course II)	4	72	*

Semester III

No	Course Title	Hrs/ wk	Hrs /Sem	Credit
1	Common Course V English	5	90	4
2	Common Course IX Second Language	5	90	4
3	Core III Classical Mechanics	3	54	3
4	Core Practical I	2	36	--
5	Complementary I (Course III)	5	90	3
6	Complementary II (Course III)	5	90	*

Semester IV

No	Course Title	Hrs / wk	Hrs /Sem	Credit
1	Common Course VI English	5	90	4
2	Common Course X Second Language	5	90	4
3	Core IV Optics	3	54	3
4	Core V Practical I	2	36	4
5	Complementary I (Course IV)	5	90	*
6	Complementary II (Course IV)	5	90	*

Semester V

No.	Course Title	Hrs / wk	Hrs / Sem	Credit
1	Core VI Electrodynamics-1	3	54	3
2	Core VII Thermal Physics	3	54	3
3	Core VIII Physics of Solids	3	54	3
4	Core IX Basic Electronics	3	54	3
5	Core X Atomic Nuclear & Particle Physics	3	54	3
6	Core Practical II	4	72	-
7	Core Practical III	4	72	-
8	Open Course-1	2	36	2

Semester VI

No.	Course Title	Hrs / wk	Hrs /Sem	Credit
1	Core XI Electrodynamics-II	3	54	3
2	Core XII Photonics	3	54	3
3	Core XIII Quantum Mechanics	3	54	3
4	Core XIV Digital Electronics	3	54	3
5 Core XV Elective A.Plasma Physics B.Astronomy & Astrophysics C.Atmospheric Physics D.Nanoscience E.Material Science F.Computational Physics		3	54	3
6	Core XVI Practical II	4	72	4
7	Core XVII Practical III	4	72	4
8	Core XVIII Project	-	-	2
9	Open Course II	2	36	2

The Hours/Credits for Complementary Theory/Practical as decided by the Board of Studies concerned is followed.

Credit Distribution of Complementary Combination							
Maths	**Electronics**		**Maths**	**Comp.Science**		**Maths**	**Chemistry**
3	2		3	2		3	2
3	2+1		3	2+2		3	2
3	2		3	2		3	2
3	2+1		3	2+2		3	2+4
	1+1						
12	**12**		**12**	**12**		**12**	**12**

SCHEME-PHYSICS (Core)

No	Semester	CourseCode	Title of the Course	Contact hr/week	Credit
1	I	1B01PHY	Methodology of Science	2	2
2	II	2B02PHY	Informatics	2	2
3	III	3B03PHY	Classical Mechanics	3	3
4	IV	4B04PHY	Optics	3	3
5	I,II,III,IV	4B05PHY	Practical I	2	4
6	V	5B06PHY	Electrodynamics I	3	3
7	V	5B07PHY	Thermal Physics	3	3
8	V	5B08PHY	Physics of Solids	3	3
9	V	5B09PHY	Basic Electronics	3	3
10	V	5B10PHY	Atomic,Nuclear & Particle Physics	3	3
11	VI	6B11PHY	Electrodynamics II	3	3
12	VI	6B12PHY	Photonics	3	3
13	VI	6B13PHY	Quantum Mechanics	3	3
14	VI	6B14PHY	Digital Electronics	3	3
15	VI	6B15PHY	Elective	3	3
16	V, VI	6B16PHY	Practical II*	4	4
17	V, VI	6B17PHY	Practical III*	4	4
18	V, VI	6B18PHY	Project	–	2

*Core 6B16PHY and 6B17PHY Practical examinations (ESE) will be held at the end of the 6th Semester.

Scheme-6B15PHY (Elective)

No	Semester	Course Code	Title of the Course	Contact hour/week	Credit
1	VI	6B15PHY	A. Plasma Physics	3	3
2	VI	6B15PHY.	B. Astronomy & Astrophysics	3	3
3	VI	6B15PHY	C. Atmospheric Physics	3	3
4	VI	6B15PHY	D. Nanoscience	3	3
5	VI	6B15PHY	E.Materials Science	3	3
6	VI	6B15PHY	F.Computational Physics	3	3

Scheme Complementary Course (Physics)

No	Semester	Course Code	Title of the Course	Contact hour/week	Credit
1	I	1C01PHY	Mechanics	2	2
2	II	2C02PHY	Electricity Magnetism & Thermal Physics	2	2
3	III	3C03PHY	Optics	3	2
4	IV	4C04PHY	Modern Physics & Electronics	3	2
5	I,II,III,IV	4C05PHY	Complementary Practical	2	4

Scheme-Open Courses

No	Semester	Course Code	Title of the Course	Contact hour/week	Credits
1	V	5D01PHY	A. Environmental Physics	2	2
2	V	5D01PHY	B. Applied Electronics	2	2
3	V	5D01PHY	C. The Universe	2	2
4	VI	6D02PHY	A.Non-conventional Energy Sources	2	2
5	VI	6D02PHY	B. Bio Physics	2	2
6	VI	6D02PHY	C. Electricity in life	2	2

Evaluation

The evaluation scheme of each Course shall contain two parts:

- Continuous Evaluation (CE)
- End – Semester Evaluation (ESE)

Direct grading using a 5- point scale will be used for CE and ESE. 25 % weight shall be given for CE and 75 % weight shall be given for ESE.

End – Semester Evaluation in Practical Courses shall be conducted and evaluated by two examiners – one internal and the other external. Theory and practical examinations (ESE) for Core, complementary and open courses shall be of 3 hours duration.

Components of Continuous Evaluation CE (Theory)

Components	Weight
a.Attendance	1
b. Assignment	1
c. Seminar / Viva	1
d. Two Test Papers	2

The continuous evaluation (CE) shall be based on periodic written tests, assignments, viva / seminar and attendance in respect of theory courses.

Written Tests: Each test paper may have duration of minimum one hour. For each course there shall be a minimum of three written tests and the best two are to be taken.

Assignments: Each student is required to submit two assignments for a theory course.

Seminar / Viva: For each theory course, performance of a student shall also be assessed by conducting a viva – voce examination or seminar presentation based on topics in that course.

The details of evaluation using the grading system are given in the regulations for UG programmes 2009.

Components of Continuous Evaluation CE (Practical)

Components	Weight
a.Attendance	1
b. Lab skill	1
c. Practical Test	1
d. Observation Book	2
e. Viva - voce	1

Lab skill is to be assessed based on the performance of the student in practical classes. Minimum one practical test paper and an internal viva – voce examination based on practical are to be conducted in each practical course. The laboratory record is the observation book itself (**no separate record book is required**). The observation book should contain an **index and a certificate page**. Separate observation books are to be used for each practical course.

A candidate shall be permitted to attend an end semester practical examination only if he / she submit a certified bonafide observation book. This is to be endorsed by the examiners.

The weightages for different components of practical examination (ESE) such as principle, formula, adjustments, connections, observations, tabulation, calculation results etc. will be decided by the Practical Examination Board.

Project:

Each student should undertake a research oriented project work under the guidance of a teacher.

Innovative subjects may be selected for project work. Students are required to submit the project report at the end of the VI semester. The CE of project will be done by the teacher guide and ESE by the examiners deputed for practical examination. The components for CE and ESE of the Project evaluation are given below.

The evaluation of the Project by the examiners will be conducted on a separate day. .

Components of Continuous Evaluation CE and ESE (Project)

Components	Weight
a.Relevance of the topic	2
b.Methodology	2
c. Project Report	4
d. Viva - voce	2

The topic of the selected project should be relevant with respect to the academic enrichment or social aspects. The methodology should include literature review, procedure and analysis. The report should be in accordance with the writing of science. Viva-voce will be conducted based on the topic.

Sd/-

Dr T L Remadevi

Chairman, BOS Physics (UG)

Core paper I -1B01PHY

Methodology of Science

Semester-I
Hours/week-2
Hours/Semester- 36
Credit-2

Module –1: History of Science
Introduction- The history of Science –Philosophy of Science- Science in the middle ages-Fall of Aristotelean Universe: Bruno, Copernicus and Galileo- Advancement in India- Modern Scientific outlook- Descartes- Newton and after- A century of genius-The newtonian synthesis- The great contemporaries of Newton- The century after Newton- A padadigm shift in Physical sciences-the new quantum theory- development of Nuclear Physics- The frontier technologies. (**Book-1: Cha-1, Cha-7.2, 7.4, 7.5, 7.6, 7.7 and Cha- 8.1, 8.2, 8.3, 8.5, Cha-9.3, 9.4, 9.6)**

Module –2: Beginning of Modern Physics
The new atom- From X-rays to the nucleus- The new Universe- Einstein and relativity- The Quantum Surprise (**Book-3: Cha-1, 2,3,4**)

Module 3: **Philosophy of Science**
What is Science-Areas of Science-Basic and applied research- why understand Science- Scientific statements- Scientific methods- Recent develpoments in Philosophy of Science (**Book-2: Cha-1,2**)

Module-4: Methodology of Science
Introduction- Selecting a topic to study- hypotheses- experimental design- performing experiments- analysis- results- Discussion of results- Models- non-experimental research- writing Science- graphing (**Book-2: Cha-3,7,8**)

Book for study:

1. An introduction to the History and Philosophy of Science-RVG Menon (Pearson education)

2. The Scientific endeavour- Jeffery A Lee ((Pearson education)

3. The History of Science from 1895 to 1945(University Press Ltd 1999)

References:

1. Roger G Newton-The truth of Science-Harvard University Press

2. Harry Colins & Trevor Pinch, The Golem-What everyone should know about Science-Cambridge University Press

3. Gieryn T F- Cultural boudaries of Science, University of Chicago Press

4. Hewitt et al – Conceptual Integrated Science-University of Chicago Press

Core paper II 2B02PHY

Informatics

Semester-II
Hours/week-2
Hours/Semester- 36
Credit-2

Module –I: Overview of Information Technology and Knowledge skills for higher education (8 hrs)

The internet- the origin of internet-Internet basics- the future of internet- Overview of operating systems and major application softwares- Data, Information and knowledge- Internet access methods, Dial-up, DSL, Cable, ISDN, Wi-Fi - academic search techniques, creating cyber presence- Social networking- Case study of academic web sites- Introduction of IT in teaching and learning, Case study of educational software, reference softwares, academic services- INFLIBNET, NICNET, BRNET.
(**Book-I: Cha-1**- 1.13, 1.14, 1.15, 1.16, 1.22 to 1.28, **Cha-2**- 2.1 to 2.7, 2.9, 2.10)

Module-II: Programming in C++ (28 hrs)

Character set- Tokens- keywords- identifiers and constants- Basic data types- Enumerated data type- constants (integer constants- single character constants – string constants – backlash character constants) - symbolic constants-Variables- Declaration of variables- Assigning values to variables, Operators and Expressions- Arithmetic operators (integer arithmetic–real arithmetic- mixed mode arithmetic) – Relational operators- logical operators- assignment operators- increment and decrement operators- Precedence of operators- Input and output

operators, Arithmetic operators, Relational expressions- logical expressions- evaluation of expressions

Control statements- "if" statement, 'if else' statement, nesting of 'if else' statement-'switch statement,Decision making and looping- "while' statement, 'do while statement- 'for' statement- 'jump' statements (go to- break- continue statements) (Book 2: Chapter 3)

Module –III:

Arrays, Structures and unions

One dimensional and two dimensional arrays- (declaration- initialization) - Definition of structures- declaration of struct members- Giving values to struct members- Definition and declaration of unions- Difference between structures and unions
(Book 4: Chapter 7-7.1, 7.2, 7.3, 7.4, 7.5, 7.6; Chapter-10-10.1, 10.2, 10.3, 10.4, 10.5, 10.12)

Functions in C++

Function prototyping and definition – Function call by reference and function call by value - Function overloading-Recursion

(Book 2: Chapter 4- 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11; Book 4: Chapter 9 – 9.16)

Module –IV:

Principles of OOP, Classes, and Objects- Object- Oriented Programming paradigm - Basic concepts of Object-Oriented Programming – Benefits of OOP – Applications of OOP – Specifying a class – Defining member functions – A C++ program with class

(Book 2: Chapter 1-1.4, 1.5, 1.6, 1.8; Chapter 5-5.3, 5.4, 5.5)

Simple Programs using class

Farenheit-Celsius conversion, Slope of a line given its end points- focal length of a lens using lens making formula, displacement- velocity and acceleration of a simple harmonic oscillation- Escape velocity and orbital velocity of a planet- to find the displacement of a particle moving with uniform acceleration

Book for study:

1. Informatics- Technology in action- Alan Evans et al (Pearson)
2. Object oriented programming with C++ - E Balaguruswamy
3. Physics through C- programming – S Palaniswamy (Pragathi Prakasan, UP)
4. Programming in ANSI C (Fourth Edition) – E Balaguruswamy

References:

5. Introduction to Computers- Peter Norton (6^{th} edn)(McGraw hill)
6. Introduction to Information technology- V Rajaraman
7. Introduction to object oriented programming with C++- Yashwant Kanetkar
8. ANSI C- E Balaguruswamy
9. Let us C - Yashwant Kanetkar(BPB Publications)
10. C++ - Robert Lafore

CORE III 3B03PHY
CLASSICAL MECHANICS

Semester: III
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Particle Dynamics

Newton's laws of motion-dynamical concept- Mechanics of a system of particle (Book 1, Ch.4)

Module 2: Conservation laws and properties of space and time

Linear uniformity of space and conservation of linear momentum--Rotational invariance space and law of conservation of angular momentum--homogeneity of flow of time and conservation of energy. (Book1, Ch.5)

Module 3: Inverse square law force

Forces in the universe--gravitational field and potential-Electric field and potential-Gravitational field due to i) thin spherical shell ii) Solid sphere-Earth's gravitational field, escape and orbiting velocities-Existance of atmosphere around a planet-gravitational self energy --electrostatic self energy-motion under force obeying inverse square law--Equivalent one body problem –motion under central forces-Some physical insights in to the nature of motion under central forces- trajectory of a particle and turning points--Kepler's laws-satellite motion. (Book1, Ch.6)

Module 4: Oscillatory motion

Simple Harmoic motion--Eergy of simple harmonic motion-damped harmonic oscillator- energy of a damped oscillator--the quality factor-examples of damping in physical system-forced harmonic oscillator-resonance--quality factor of a driven oscillator--electrical resonancesuperposition principle.

(Book 1, Ch 9)

Module 5: Relativity

Inertial and non-inertial frames—Galilean transformation—Postulates of special relativity—Lorentz transformation—inverse Lorentz transformation—velocity addition—length contraction—time dilation—twin paradox—relativistic momentum—relativistic mass—mass and energy—energy and momentum-concepts of General relativity-basic ideas of four dimensional spacetime. (Book 4, Ch 1)

BOOKS FOR STUDY

1. Mechanics – Hans and Puri (2nd Edn) - T M H.
2. Mechanics -- Takwala and Puranic.
3. Mechanics --- Goldstein
4. Concepts of Modern Physics (6th Edn) ----Arthur Beiser –TMH Edn.

CORE IV
4B04PHY OPTICS

Semester: IV
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Matrix Method in Paraxial Optics.

Introduction – the matrix method – effect of translation – effect of refraction – imaging by a spherical refracting surface – coaxial optical systems – unit planes – nodal planes – a system of two thin lenses. (Book I, Ch 4)

Module 2: Interference by Division of Amplitude.

Interference in thin films – the cosine law – nonreflecting films – high reflectivity by thin film deposition – interference by wedge shaped film – Newton's rings – the Michelson interferometer.
(Book I, Ch 13)

Module 3: Fraunhoffer DiffractionSingle slit, double slit, N slit diffraction patterns – positions of maxima and minima – width of the principal maxima – the diffraction grating – resolving power of grating – resolving power of a prism. (Book I, Ch 16)

Module 4: Fresnel Diffration

Fresnel half period zones – zone plate – diffraction at a straight edge – Fresnel diffraction by a circular aperture.(Book I, Ch 17)

Module 5: Polarization

Introduction- Production of polarized light- Malu's law- Superposition of two disturbances- The phenomenon of double refraction- Interference of polarized light- Quarter wave plates and half wave plates- Analysis of polarized light- Optical activity

(Book 1, Ch 19)

Books for Study

1. Optics – II Edn – Ajoy Ghatak – TMH Publishing Co.

Reference:

1. Optics – IV Edn – Eugene Hecht – Pearson Education**.**

CORE V
4B05PHY PRACTICAL I

Semester: I, II, III &IV
Hours/ Week: 2
Credit: 4

BASIC EXPERIMENTS IN PROPERTIES OF MATTER, OPTICS, ELECTRICITY &MAGNETISM

1. Flywheel- Moment of inertia
2. Torsion pendulum- Moment of inertia of a disc and rigidity modulus
3. Compound pendulum- To find 'g' and radius of gyration
4. Young's modulus of the material of bar-Non-uniform bending using pin & microscope
5. Young's modulus of the material of bar -Uniform Bending using optic lever
6. Surface Tension by capillary rise method
7. Rigidity modulus of a material-Static torsion
8. Spectrometer – Refractive index of the material of a prism
9. Spectrometer –Dispersive power of a prism
10. Melde's String- Frequency of a tuning fork
11. Lee's disc- Thermal conductivity of a bad conductor
12. Newton's law of cooling- Specific heat of a liquid
13. Potentiometer- - resistance &resistivity
14. Potentiometer- Calibration of low range voltmeter

15. Carey Fosters Bridge- resistance &resistivity
16. Deflection Magnetometer- Tan A and Tan B
17. Deflection Magnetometer- Tan C
18. Deflection Magnetometer & Box type vibration magnetometer- m and B_0
19. Searle's Vibration magnetometer- moment and m_1/m_2
20. Liquid Lens –Refractive index of a liquid and material of the lens with mercury.
21. Liquid Lens –Refractive index of a liquid and material of the lens with another liquid of known refractive index
22. Program in C++ - To calculate Standard Deviation
23. Program in C++ -To solve Quadratic Equation
24. Program in C++ -To find the transpose of a matrix

CORE VI 5B06PHY
ELECTRODYNAMICS I

Semester: V
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Vector Analysis

Differential calculus- Gradient-Divergence- curl- product rules,Integral Calculus- Line, surface and volume integrals- fundamental theorems for Gradient, divergence and curl, curvilinear coordinates-Spherical polar and cylindrical-Dirac Delta function (Ch 1, Book 1)

Module 2: Electrostatics.

The electrostatic field –Coulomb's Law-The electric field-Continuous charge distributions-Field lines & Gauss's Law –The divergence of **E** – Applications of Gauss's Law (Why symmetry is crucial – plane symmetry- cylindrical symmetry –spherical symmetry -uniform & non-uniform charge distributions) –The curl of **E**

Electric potential - comments on potential – Poisson's equation & Laplace equation –The potential of a localized charge distribution – Electrostatic boundary conditions – Work done in moving a charge – The energy of a point charge distribution – The energy of a continuous charge distribution – Comments on electrostatic energy – Basic properties of conductors – induced charges – The force on a surface charge – Capacitors (Ch 2, Book 1 & Ch 3, Book 2)

Module 3: Electrostatic Fields in Matter.

Dielectrics –induced dipoles - Alignment of polar molecules –Polarization - Bound charges –

Physical interpretation of bound charges – The field inside a dielectric – Gauss's law in the presence of a dielectric –Displacement vector – Linear dielectrics –Susceptibility –permittivity –dielectric constant – Boundary value problems with linear dielectrics – Energy in dielectric systems –Force on dielectrics – Clausius –Mossotti equation (Ch 4, book 1)

Module 4: Magnetostatics

Magnetic fields- The Lorenz force law – Cyclotron motion –Cycloid motion –- Magnetic force & work -–Line current –Surface current –Volume current- Continuity equation –Steady currents –Biot Savart law— Magnetic field due to(Infinitely long wire –circular coil –solenoid] -The divergence & Curl of **B** – Ampere's law –Applications of Ampere's law –Comparison of magnetostatics & electrostatics –Magnetic vector potential – Magnetostatic boundary conditions –Multipole expansion of vector potential & magnetic dipole moment (Ch 5, book 1& Ch 5, book 2)

Books for Study

1. Introduction to electrodynamics -David .J .Griffiths

2. Electromagnetic field theory fundamentals - Bhag Guru & Huseyin Hiziroglu

CORE VII 5B07PHY
THERMAL PHYSICS
Semester: V
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module I Introduction:-

Macroscopic and Microscopic points of view, Thermal Equilibrium-Zeroth Law -Concept of Temperature, Thermodynamic Equilibrium, Equation of state, Hydrostatic systems, Intensive and Extensive co-ordinates (Ch 1&2-Book1)

Module II Work, Heat and First Law:-

Concept of work, Quasi-static process- Work in changing the volume of a hydrostatic system-PV Diagram, Dependence of hydrostatic work on path- Calculation of $\int PdV$ for Quasi-static processes, work and heat - Adiabatic work –Internal energy function, First Law of Thermodynamics - Mathematical Formulation and Differential form-Application to Thermodynamic systems, concept of heat Ideal Gases-Equation of state for ideal Gas-First Law applied to ideal gas-
Isothermal, Adiabatic, Isochoric and Isobaric processes-Derivation of equations- Kinetic theory of the ideal gas-postulates-mean free path, equation for pressure exerted by an ideal gas
(Ch 3, 4 & 5- Book1)

Module III Heat Engines and Second Law:-

Conversion of Heat into work and vice-versa, Heat engines-efficiency-Gasoline engine-Diesel Engine, Kelvin –Plank Statement of II Law of Thermodynamics- Refrigerator and Clausius' statement of II Law- Equivalence of the two forms of II law. Reversibility and Irreversibility, mechanical, Thermal and Chemical Irreversibility –Conditions for reversibility Carnot cycleefficiency-Carnot Theorem and corollary-Thermodynamic scale of Temperature.(Ch .6&7 - Book1)

Module IV Entropy

Second law and concept of entropy, Clausius inequality-entropy of an ideal gas, TS Diagram-Entropy and reversibility, entropy and Irreversibility-principle of Increase of Entropy-entropy and Disorder, Principle of Caratheodory, Thermodynamic Potentials-Enthalpy, Helmholtz and Gibb's functions, Maxwell's relations, TdS equations, Phase transition-Clausius-Clapeyron Equation I order Phase Transitions, chemical potential. (Ch 8, 10- Book 1, Ch.7, 9-Book 2)

Module V Low temperatures.

Joule-Kelvin effect, liquefaction of gases-Adiabatic demagnetization Third Law of Thermodynamics (Ch.8 -Book 2)

Books for Study:

1. Heat And Thermodynamics: M.W. Zemansky & R.H.Dittman 7th edition (TMH)
2. Basic Thermodynamics: Evelyn Guha (Narosa).
3. Concepts of Modern Physics-Arthur Beiser 6th edition (TMH)

Reference:

Berkeley Physics Course Vol.5- Statistical Physics

CORE VIII 5B08PHY
PHYSICS OF SOLIDS
Semester: V
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module–I: Crystal Bonding

Different types of bonding in Crystals- ionic bond- covalent bond- metallic bond- hydrogen bond- Vander Waals bond.(Book 1- Ch. 3)

Module –II: Crystal Geometry

Crystal lattices- Crystal Planes- miller Indices,- Unit cells-Typical Crystal Structures, and symmetry elements in Crystals- Cordination numbers- packing fraction. (Book 1- Ch 4)

Module – III: Crystal Diffraction

X-ray diffraction by a crystal lattice- Laue formation of X-ray diffraction- Laue spots- Bragg's law- Bragg's X-ray Spectrometer- Powder Crystal method- Rotating Crystal method. (Book 1- Ch 5)

Module-IV: Electrical properties of Solids

Drude's Theory- Classical free electron theory- Drawbacks of Classical theory, Relaxation time, Collision time, Mean free path- Electron scattering and sources of resistance in metals- Electron scattering mechanisms and variation of resistivity with temperature (Book 1- Ch 6)

Module-V: Lattice Vibration and thermal properties

Lattice vibrations- quantization-phonons-Lattice heat capacity- classical theory- Einstein's model- limitations- Debye's model- Thermal conductivity of solids- Thermal conductivity due to electrons - Thermal conductivity due to phonons (Book 1- Ch 7)

Module-VI: Superconductivity

Zero Resistivity- Critical Temperature- Meissner effect- Isotope effect- type I and II superconductors- BCS theory- Josephson's effect(qualitative idea)- High temperature T_c- Applications. (Book 1- Ch 8)

Book for study:

1. Sold State Physics-S O Pillai (New age international)

References:

2. Sold State Physics- M A Wahab (Narosa)
3. Introduction to Solids- Leonid V Azaroff(TMH)
4. Introduction to Solids- Ali Omar
5. Solid State Physics- R K Puri and V K Babbar (S chand)
6. Solid State Physics – Gupta and Kumar

CORE IX 5B09PHY
BASIC ELECTRONICS

Semester: V
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Bipolar Junction Transistors and their biasing.

CB, CE, CC Characteristics, DC Load line and Bias point, Base bias, Collector to base bias, Voltage divider bias, Comparison of bias circuits, Bias circuit design, Thermal stability-Biasing transistor switching circuits

Module 2: AC analysis of BJT circuits.

Coupling and bypass capacitors-AC load lines-Transistor models, r- parameters, h- Parameters, CE circuit analysis

Module 3: Field Effect Transistors.

JFET-n channel and p channel- characteristics-JFET parameters- FET biasing –Gate bias, Self bias, and Voltage divider bias.

Module 4: Amplifiers and **Feed back in Amplifiers**

Frequency response -Single stage CE amplifier- Capacitor coupled and Direct coupled two stages amplifiers -Audio power amplifiers - Transformer coupled Class A, Class B and Class AB amplifiers, Class C tuned amplifier. Series voltage negative feed back-advantages-Different types of feed back.

Module 5: Operational Amplifiers

Integrated circuit operational amplifiers- Voltage follower, Inverting, Noninverting, Summing and Differential amplifier circuits using OP-AMPS, OP-AMP Differentiator and Integrator

Module 6: Signal generators

Concept of positive feed back-Barkhausen criterion-Phase shift, Hartley, Colpittts and Wien Bridge Oscillators

Books for study- Electronic Devices and circuits-David A Bell-(Oxford)

Books for reference

1. Electronic Devices and circuits-Robert L Boylestad & Luis Nashelsky (PHI)

2. Electronic Devices and circuits-Theodore F Bogart etal (Pearson)
3. The Art of Electronics-Paul Horowitz-Winfield Hill (Cambridge)
4. Basic Electronics-Solid state-B L Theraja (S Chand)

CORE X 5B10PHY
ATOMIC, NUCLEAR AND PARTICLE PHYSICS

Semester: V
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Atomic Structure.

The nuclear atom, Rutherford scattering, electron orbits, atomic spectra, the Bohr atom, energy levels and spectra, correspondence principle, nuclear motion, atomic excitation, spontaneous and stimulated emission processes. (Book1 -Ch. 4)

Module 2: Many- Electron Atoms.

Electron spin, exclusion principle, symmetric and antisymmetric wave functions, periodic table, atomic structures, atomic structure and chemical behaviour, spin-orbit coupling schemes – L-S and j-j coupling, total angular momentum, X-ray spectra. (Book1 -Ch. 7)

Module 3: Nuclear Structure.

Nuclear composition, nuclear properties, nuclear stability, nuclear binding energy, liquid drop model, the semi-empirical mass formula, shell model, meson theory of nuclear forces. (Book1 -Ch. 11)

Module 4: Nuclear Transformations.

Radioactive decay, half-life, radioactive series, scattering cross section, nuclear reactions, nuclear fission, nuclear reactors, nuclear fusion, energy production in stars, fusion reactors – tokamak, ITER (Book1 -Ch. 12)

Module 5: Elementary Particles.

Interaction of charged particles, leptons, hadrons – baryons and mesons, particle quantum numbers, quark structure of hadrons, the eightfold way, fundamental interactions and exchange particles. (Book1 -Ch. 13)

Module 6: Statistical Mechanics

Statistical distribution- Three types of statistics-Maxwell Boltzmann statistics- Molecular energies in an ideal gas- Quantum Statistics- Rayleigh Jeans formula- Planck radiation law- Einstien’s approach- Specific heat of Solids- Free electron in ametal- Electron energy distribution- Dying stars (Book1 -Ch. 9)

Books & References

1. **Text Book:** Concepts of Modern Physics – Arthur Beiser, Tata McGraw-Hill, New Delhi

2. **Work Book**: Modern Physics - Shaum's Outline Series by Ronald Gautreau and William Savin, Tata McGraw-Hill, New Delhi

References:

Atomic Physics - Christopher J. Foot, Oxford University Press, Cambridge (2008)

Particle Astrophysics – Donald Perkins, Oxford University Press, Cambridge (2008)

Atoms, Molecules and Compounds – Philip Manning, Chelsea House Publishing, New York (2008)

The Particle Hunters – Yuval Ne'eman and Yoram Kirsh, Cambridge University Press;
2nd Edn (1996)

CORE XI 6B11PHY
ELECTRODYNAMICS II

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Magnetostatic Fields in Matter

Magnetization – Torques and forces on magnetic dipoles –Effect of a magnetic field on atomic orbits –Magnetization –The field of a magnetized object –Bound currents –Physical interpretation of bound currents –The auxiliary field H –Deceptive parallel–Magnetic susceptibility and permeability – Ferromagnetism (Ch 6, Book 1)

Module 2: Electrodynamics

Ohm's law - Electromotive force – Motional e.m.f - electromagnetic induction-Induced electric field -self inductance –Mutual inductance –Inductance of coupled coils – Energy in a magnetic field – Electrodynamics before Maxwell-How Maxwell fixed Ampere's law– Maxwell's equations & magnetic charge –Maxwell's equations inside matter - -boundary conditions- The continuity equation- –Poynting's theorem- Newton's third law in electrodynamics – potential formulations of electrodynamics –Scalar & vector potentials

(Ch 7,8,10, Book 1 & Ch 7, Book 2)

Module 3: Electromagnetic Waves

Introduction –The wave equation in one dimension – Sinusoidal waves –Boundary conditions – Reflection and transmission – Polarization -Electromagnetic waves in vacuum- The wave equation for E & B –Monochromatic plane waves –Energy and momentum in electromagnetic waves – Propagation in linear media –Reflection and transmission at normal incidence (Ch 8, Book 1)

Module 4: Applications of Static Fields & Time Varying Electromagnetic Fields

Deflection of a charged particle –Cathode ray oscilloscope –Electrostatic generator-Electrostatic oltmeter –Magnetic separator –Magnetic deflection –Cyclotron-The velocity selector and mass spectrometer –The Hall Effect –Magneto hydrodynamic generator –An electromagnetic pump – A direct current motor- Applications of electromagnetic fields – The auto transformer -The Betatron. (Ch 6&7, Book 2)

BOOK FOR STUDY

1. Introduction to electrodynamics -David .J.Griffiths

2. Electromagnetic field theory fundamentals - Bhag Guru & Huseyin Hiziroglu

CORE XII 6B12PHY
PHOTONICS & SPECTROSCOPY

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Lasers

Einstein coefficients--population inversion—threshold condition –optical resonator -- line broadening mechanisms (natural, collision, Doppler -- qualitative ideas)- Laser systems—Ruby laser, Nd: YAG laser—He-Ne laser—CO_2 laser—Dye laser-Semiconductor laser. Applications of lasers—laser induced fusion—applications in material processing (welding, hole drilling, cutting)—Lidar—lasers in medicine. (Book 1, 2, 3)

Module 2: **Holography**

Recording and reconstruction – applications of holography – holographic interferometry – holographic computer memories (Book 4)

Module3: Fibre Optics

Introduction—step index fibre—numerical aperture—pulse dispersion in step index fibres—graded index fibres ---material dispersion—single mode fibres-Fibre materials manufacture—glass fibres—plastic fibres –losses in fibres – bending losses –intrinsic fiber losses – scattering losses – absorption losses—local area networks—integrated optics—slab and stripe waveguides. Fibre optic sensors – multimode passive optical fibre sensors –active optical fibre sensors (Book 1, 4)

Module 4: Spectroscopy

Regions of spectrum- Basic elements of practical spectroscopy- The width and intensity of spectral lines- Microwave spectroscopy- Rotation of molecules- Rotational spectra- The effect of isotopic substitution- Spectrum of rigid Diatomic molecules -Infrared Spectroscopy- The vibrating rotating molecule- diatomic vibrating rotator- The vibration – rotation spectrum of Carbon monoxide

Raman Effect- Quantum theory of Raman effect- Raman spectroscopy- Pure rotational Raman spectra- Vibrational Raman Spectra (qualitative study) (Book 2)

Book for Study

1. Optics – II Edn - Ajoy Ghatak - TMH Publishing Co.
2. Fundamentals of Molecular Spectroscopy- Colin.N.Banwell & Elaine M McCash(TMH)

3. Lasers Theory and Applications - K. Thyagarajan and AK Ghatak – Macmillan India
4. Optical Electronics - Ajoy Ghatak and K. Thyagarajan – Cambridge

CORE XIII 6B13PHY
QUANTUM MECHANICS

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Origin of Quantum Theory

The Limits of Classical Physics-Planck's Quantum Hypothesis- Einstein's theory of Photoelectric effect- Compton Effect- Quantum theory of Specific heat- Bohr atom model of Hydrogen atom- Existence of Stationary states- Wilson Sommerfield Quantization rule- Elliptical orbits of hydrogen atom- The harmonic oscillator- Particle in a box- The Correspondance Principle- The Stern Gerlach Experiment- Inadequacy of quantum Theory (Book 1 Chapter 1)

Module 2: Wave Mechanical Concepts

Wave nature of particles- The uncertainity Principle- the Principle of Superposition- Wave packet- Time dependent Schrodinger equation- interpretation of wave functions- Ehrenfest' theorem.
(Book 1 Chapter 2)

Module 3: Eigen Functions and Eigen Values

Time independent Schrodinger Equation- Stationary states-Admissibility conditions on the wave functions -Eigen Functions and Eigen Values, Postulates of Quantum Mechanics-Simultaneous measureability of observables (Book 1 Chapter 2 and Chapter -3.3, 3.5, 3.6)

Module 4: One diamensional Energy Eigen value problems

Square well potential with rigid walls- Square well potential with finite walls-square potential barrier- Alpha emission- Linear Harmonic Oscillator- Schrodinger method- free particle
(Book 1 Chapter 5)

Book for study

1. Quantum Mechanics – G Aruldhas (PHI Learning, New Delhi)

Book for reference

1. Concepts of Modern physics – Arthur Beiser (John Weily & Sons Inc)
2. Modern Physics – Kenneth S.Krane (John Weily & Sons Inc)
3. Quantum physics – Stephen Gasiorowicz (John Wiley & Sons, Inc)

CORE XIV 6B14PHY
DIGITAL ELECTRONICS
Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Number Systems, Operations and Codes.

Binary numbers-Decimal to Binary Conversion-Binary Arithmatic-
1's and 2's Complements of Binary Numbers-Signed Numbers-Arithmetic Operations with Signed Numbers-Hexadecimal Numbers-Octal Numbers-Binary Coded Decimals-Digital Codes and Parity.

Module 2: Logic Gates.

Positive and Negative Logic-The inverter-The AND Gate-The OR Gate-The NAND Gate-The NOR Gate-The Exclusive-OR and Exclusive-NOR Gate

Module 3: Boolean algebra and Logic Simplification.

Boolean Operations and Expressions-Laws and rules of Boolean Algebra-
De-Morgans Theorems-Boolean Analysis of Logic circuits-Simplification Using Boolean Algebra-Standard forms of Boolean Expressions-Boolean Expressions and Truth Tables-The Karnaugh Map- Karnaugh Map SOP Minimization-Karnaugh Map POS Minimization

Module 4: Combinational Logic.

The Universal Property of NAND and NOR gates. Basic Adders-The Half-Adder-The Full-Adder-Parallel Binary Adder-4 Bit Parallel Adder.

Module 5: Modulation and Demodulation.

Methods of Modulation-Amplitude modulation-Mathematical analysis of Modulated Carrier wave-Power relations-Frequency Modulation-Deviation ratio-FM sidebands-carrier swing-Mathematical Expression for FM wave (no derivation)-Pulse modulation-PAM, PWM, PPM, PCM (Basic ideas only) Demodulation-Diode detector-Superheterodyne AM receiver. (Book 2, 3)

Book for study

1. Digital Fundamentals-(eighth edition)-Thomas L Floyd-(Pearson Education)

2. Basic Electronics- B L Theraja – (S Chand)

3 .Analog and Digital Communication-J.S.Katre-(Tech-Max Publications)

References

1. Introduction to Digital Circuits-Theodore Bogart Jr.-MGH.

2. Digital Principles and Applications-A P Malvino and D P Leach-(TMGH).

3. Digital circuits and Design –S Salvahanan Sarivazhagan-(Vikas Publishers).

4. Fundamentals of Digital Ciruits-A.Anandakumar-(PHI).

CORE XV 6B15PHY (Elective)
A. PLASMA PHYSICS

Semester: VI
Hours/ Week: 3
Hours/ Semester**: 54**
Credit: 3

Module 1

Introduction: General Properties- Criteria for the definition of Plasma- The occurance of Plasma in nature- Theoretical description of Plasma phenomena. Electron Plasma oscillations- The Debye shielding problem- plasma sheath-plasma probe (Book 1)

Module 2

Concept of Temperature-Applications of plasma: Gas discharges- Controlled thermo nuclear fusion- Space Physics- modern Astro Physics-MHD energy conversion- Solid state Plasmas-Gas Lasers. (Book 2 Ch: 1)

Module 3

Plasma as fluids (introduction)- Relation of Plasma Physics to ordinary electro magnetics – the fluid equation of motion- the convective derivative – The stress tensor – equation of continuity-
Equation of state – The complete set of fluid equations (Book 2 Ch: 3)

Module 4

Introduction – Energy conservation-Uniform electrostatic field-Uniform electrostatic and magnetostatic fields- Drift due to an external force. (Book 1)

Module 5

Equations of Kinetic theory-Plasma oscillations and Landau damping (general idea only)-Meaning of Landau damping. (Book 2 Ch: 7)

Books for study

1. Fundamentals of Plasma Physics –J.A.Bitten court
2. Plasma Physics-F.Chen

CORE XV 6B15PHY (Elective)
B.ASTRONOMY AND ASTROPHYSICS

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: The Celestial coordinates:

Stellar positions- the horizontal system- the equatorial systems- the ecliptic system- Stellar motions (Book 1 chap 3)

Module 2: Apparent luminosity

Magnitude scale- measurement of apparent luminosity- the visual methods- photographic methodphotoelectric method- various magnitude systems- the visual system-photographic systemphotoelectric system- UBV system- Baker's RGU system- Infrared system. (Book 2 chap 3)

Module 3: Stellar distances.

Measurement of distances within the solar system- Moon- planets and sun- Other methods of determining the astronomical unit- Aberration of star light- radial velocities of stars- Stellar distances- Geometrical methods- Cluster parallax- Secular parallax- Angular size method- Method of luminosity distance- Concept of absolute magnitude- Spectroscopic parallax- Period luminosity law. (Book 2 chap 4)

Module 4: Astronomical instruments.

Optical telescopes- Main parts -General properties of a telescope- Light gathering power- Angular Magnifications- Resolving power- Telescopic aberrations- Chromatic aberration- Spherical aberration- Coma- Asigmatism and curvature of field- Distortion- Special purpose telescopes- Meridian circle- Astrograph- Infrared telescope- Solar telescope. (Book 2 chap 19)

Module 5: Astrophysics.

Introduction- Classification of stars- The Harvard classification system- HR diagram- Luminosity of a star- Stellar evolution- White Dwarfs- Electrons in a white dwarf star- Chandrasekhar limit- Neutron stars- Black holes- Supernova explosion- Photon difussion time- Gravitational potential energy of a star- Internal temperature of a star- Internal pressure of a star. (Book 3 chap 78)

Books for study

1. An Introduction to Astrophysics- Baidyanath Basu

2. Astrophysics Stars and Galaxies- K D Abhyankar

3. Modern Physics- R Murugeshan, Kruthiga Sivaprasath (13th edition)

CORE XV 6B15PHY (Elective)
C. ATMOSPHERIC PHYSICS

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Basic Ideas.

Planetary atmosphere-Equilibrium temperature-Hydrostatic equation-Adiabatic lapse rate- Sandstorm theorem

Module 2: A Radiative equilibrium model.

Black body radiation-Atmospheric windows-Absorption and emission-Radiative equilibrium in atmosphere- Radiative time constants-The green house effect

Module 3: Atmospheric Thermodynamics.

Entropy of dry air-Vertical motion of saturated air-The tephigram-Total potential energy of an air column-Available Potential Energy-Zonal and eddy energy.

Module 4: More Complex radiation transfer.

Solar radiation: Its modification by scattering-Absorption of solar radiation by ozone

Absorption by single line-Transmission of atmospheric path- Integral equation of transfer-Global radiation budget

Module 5: Atmospheric optics.

Visibility-Attenuation of light-Turbidity-Optical phenomena- Rainbows-haloes-corona-glorymirage-Atmospheric refraction-Atmospheric scattering-Raleigh and Mie scattering (Basic ideas)

Module 6: Clouds.

Cloud formation – cloud classification – low clouds – precipitating clouds – middle clouds – High clouds – The growth of cloud particles – The radiative properties of clouds – Radiation transfer in clouds – cloud radiation feedback

Book for study

Physics of atmosphere - John Houton 3rd edition Cambridge University Press

References

Introduction to theoretical meteorology – S L Hess

An Introduction to atmospheric Physics D G Andrews

Meteorology- Understanding the atmosphere Steven A Ackerman and John A Knox

CORE XV 6B15PHY (Elective)
D. NANOSCIENCE

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module I: Introduction

Length scales in Physics- nanometer- Nanostructures: Zero, One Two and Three dimensional Nanostructures-Size effect and special properties of Nanoparticles – definition of nanoparticles – features of nanoparticles – evaluation of size of nanoparticles – properties of nanoparticles and size effect – particle size – definition of particle size .

Module: II. Preparation of nanoparticles

Bottom up and top down approaches – Self assembly of nanoparticles (Section 4.6)- Grinding method (Section 2.2.5)

Module III Properties of nanoparticles

Composite structure - Surface characteristics - mechanical property – Electrical properties (Section 1.11.3 excluded) – Magnetic properties –optical properties (Sections 1.9 to 1.13)

Module IV Structural Control of nanoparticles

Hollow particles – core-shell particles –Composite structure (section 2.4.1) – Nanoparticle design for DDS – Carbon nanotubes

Module V Characterization of nanostructure:

Crystal structure – X- ray diffraction method – determination of crystallite size- Scherrer formula Qualitative study of the following techniques -Small angle X-ray scattering – Neutron diffraction – Raman Scattering- AFM – STM – FT IR –XPS

Module VI Environmental and safety issues with nanoparticles

Nanoparticles and environment- problems caused by nanoparticles- removal of nanoparticles (Chapter 7)

Book for Study:

Nanoparticle Technology Handbook – M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama (Eds.), Elsevier 2007

Reference Books:

1. Encyclopedia of Materials Characterization, Surfaces, Interfaces, Thin Films, Eds. Brundle, Evans and Wilson, Butterworth – Heinmann, 1992

2. Springer Handbook of nanotechnology, Bharat Bhushan (Ed.), Springer-Verlag, Berlin, 2004

CORE XV 6B15PHY (Elective)
E. MATERIALS SCIENCE

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module I- Introduction-Materials Science-Levels of structure- Classification of engineering materials – Modern materials (Book 1, Cha 1.1)

Module II -Imperfections in solids-Types of imperfections- Point Defects- line defects- surface defects- volume defects- Sources of Dislocation- Movement of dislocation- Solidification of crystalline materials- Diffusion in solids- Mechanism of diffusion- Fick's laws of diffusion- Applications of diffusion. (Book 1, Cha 2.1 to 2.5 and 2.8)

Module III- Mechanical properties of materials- different types-Factors affecting the mechanical properties of a metal (Book 2-Chapter 6)

Module IV- Organic materials- organic compounds- polymers- polymerization-strengthening mechanism of polymers-plastics-thermoplastics- thermosetting plastics- synthetic rubbers- composite materials- Ceramics- glasses- smart materials- nano materials- bio materials- optical fibres- super alloys (Book 2-Chapter 14, 15 and Book 1- Chapter 4.9 to4.15)

Module V- Semiconducting materials- semiconductor devices- Insulating materials- Polarization in an insulating material- dielectric strength- Ferroelectric material- Magnetic materials- classification of magnetism in magnetic materials-Magnetic hystersis-classification of magnetic materials (Book 2- Chapter 16.15-16.28, 17, 18)

Text for study:

1. Metallurgy and Materials science- S Jose and E V Mathew (Pentagon Educational services, Kollam)

2. Materials Science- R S Khurmi and R S Sedha(S Chand)

References:

1. Materials science and engineering- V Edn- V Raghavan (PHI)
2. Materials Science- G K Narula, K S Narula and V K Gupta (TMH)

CORE XV 6B15PHY (Elective)
F. COMPUTATIONAL PHYSICS

Semester: VI
Hours/ Week: 3
Hours/ Semester: 54
Credit: 3

Module 1: Introduction to C programming (Book no.1)

Type declaration-Arithmetic instructions-Variables-Logical statements-Important statements

Graphics related to physics-Gotoxy-Setcolor-Setfilstyle-Rectbv angle-Line-Poly-Drawpoly-Delay-Settextstyle-Outtextxy –Move to

Module2: Introduction to Fortan-77 language (Book no.2)

Characters, data types, operators and expressions, built in FORTRAN functions-type declaration statement-if and go to statement-do loops-arrays

Module 3: Numerical approach to physical problems (Book no.1)

Euler method-Feynman-Newton method-Runge Kutta method-Predictor corrector method-Fourier analysis

Module 4: Simulations in physics using c language (Book no.1)

Freely falling bodies-Body falling through viscous medium-Projectiles-Motion of satellites-Harmonic oscillator-Damped harmonic oscillator-Forced oscillations-Travelling pulse-Superposition of waves-Fourier analysis

Module 5: Computer problems using FORTRAN (Book no.2)

Finding even and odd numbers between given limits-minimum, maximum and range of numbersfrequency distribution of table of data-mean and standard deviation-sum of a finite series-matrix algebra-roots of a quadratic equation.

Book for study:

1. Physics through C-programming by S.Palaniswamy- Published by Pragathi Prakasan, Post Box No.62, Begum Bridge, Meerut 250 001 U.P

2. Computational Physics by V.K.Mittal, R.C.Verma & S.C.Gupta-Published by Ane Books, 4821,Pawana Bhawan,first floor,24 Ansari Road,Darya Ganj,New Delhi-110 002

Reference:

Let us C by Yaswant Kanetkar –published by BPB Publications, B-14,Connaught place,New Delhi

CORE XVI 6B16PHY
Practical II

Semester: 5 & 6
Hours/ Week: 4
Credit: 4

EXPERIMENTS IN OPTICS AND ELECTRICITY

1. Spectrometer –i-d curve
2. Spectrometer –i-i' curve
3. Spectrometer-Cauchy's constants assuming wavelengths
4. Spectrometer –grating-normal incidence
5. Spectrometer –grating- minimum deviation
6. Small angled prism- refractive index of the material by normal incidence & emergence
7. Air Wedge-Diameter of a thin wire
8. Newton's Rings- wavelength of sodium light
9. Laser-Slit width from diffraction pattern
10. Potentiometer- Calibration of ammeter
11. Potentiometer-Calibration of High range voltmeter
12. Potentiometer-Reduction factor of TG
13. Circular coil- Determination of m and B_0
14. Carey Fosters' Bridge-Temp-coefficient of resistance
15. Conversion of Galvanometer into voltmeter- calibration using potentiometer
16. Conversion of Galvanometer into ammeter- calibration using potentiometer
17. Verification of Thevenin's and Norton's theorem
18. Magnetic flux density of an electromagnet using search coil
19. Mirror Galvanometer-Figure of Merit
20. Ballistic Galvanometer- ballistic constant using HMS
21. Ballistic Galvanometer- ballistic constant using standard solenoid
22. Ballistic Galvanometer- absolute capacity of a capacitor
23. Ballistic Galvanometer- high Resistance by Leakage
24. Ballistic Galvanometer- mutual inductance

CORE XVII 6B17PHY

Practical III

Semester: 5 & 6

Hours/ Week: 4

Credit: 4

EXPERIMENTS IN ELECTRONICS

1. Common emitter amplifier-Frequency response
2. DC amplifier-Gain
3. Two stage R C coupled amplifier-Gain
4. Multi vibrator- using Transistors
5. Rectifiers -half wave & full wave (2 diodes)- study of ripple factor with and without filter
6. Bridge Rectifier- study of ripple factor with and without filter
7. Clippers and clampers using diodes
8. Construction of a voltage regulator using Zener diode after finding Zener voltage
9. Construction of a Single transistor voltage regulator
10. Construction of an IC voltage regulator
11. Voltage multiplier using diodes
12. Realization of Logic gates using transistors
13. Characteristics of a common base transistor
14. Characteristics of a common emitter transistor
15. Characteristics of JFET
16. Common emitter amplifier-Gain
17. Multi vibrator- using IC 555
18. Feed back circuits-voltage series and current series
19. Hartley Oscillator using Transistor
20. Colpitts oscillator using Transistor
21. Phase Shift Oscillator using Transistor
22. Op-amp- inverting and non-inverting amplifier, voltage follower
23. Op-amp –differentiator & integrator
24. Op-amp- multi vibrator

General Pattern of B.Sc. Physics Core/ Complementary/Open(Theory)Question Paper

Reg. No: **Course Code:**
Name :
…… Semester ……..Programme

Course Title … … …
Time: 3 Hours **Total Weight: 30**

Section A

(Multiple choice questions in bunches of four. Each bunch carries a Weightage of 1)

1. Bunch of 4 multiple choice questions
i)
ii)
iii)
iv)
2. Bunch of 4 multiple choice questions
i)
ii)
iii)
iv)

Section B

(Short answer questions. **Eight** questions; Answer any **Six.** Each question carries a weightage of 1)

3. Short answer type question.
4. Short answer type question
5. Short answer type question
6. Short answer type question
7. Short answer type question
8. Short answer type question
9. Short answer type question
10.Short answer type question

Section C

(Short essay/ problem or both. **Twelve** questions; Answer any **Nine.** Each question carries a weightage of 2)

11. Short essay or problem
12. Short essay or problem
13. Short essay or problem
14. Short essay or problem
15. Short essay or problem
16. Short essay or problem
17. Short essay or problem
18. Short essay or problem
19. Short essay or problem
20. Short essay or problem
21. Short essay or problem.
22. Short essay or problem.

Section D

(Long essay questions. **Two** questions; Answer any **One**. Each question carries a weightage of 4)

23. Long essay
24. Long essay

Sd/-
Dr T L Remadevi,

Chair person, BOS Physics(UG)

KANNUR UNIVERSITY

SCHEME & SYLLABUS

PHYSICS (COMPLEMENTARY)

With effect from 2010 Admission

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

Scheme and Syllabus-PHYSICS COMPLEMENTARY

No	Semester	Course Code	Title of the Course	Hours/ week	Credits
1	I	1C01PHY	Mechanics	2	2
2	II	2C02PHY	Electricity, Magnetism & Thermal Physics	2	2
3	III	3C03PHY	Optics	3	2
4	IV	4C04PHY	Modern Physics & Electronics	3	2
5	I,II ,III ,IV	4C05PHY	Complementary Practical	2	4

1C01PHY
MECHANICS
Semester: 1
Hours/Week: 2
Hours/ Semester: 36
Credit: 2

Module I Elasticity:-

Introduction Poisson ratio, relation connecting modulii of elasticity and Poisson's Ratio, Bending of Beams-Bending Moment ,Cantilever ,Transverse vibrations of a loaded cantilever, Uniform and Non-uniform Bending, Twisting Couple on a cylindrical rod-Torsional Oscillations, Work done in twisting a rod (*Relevant chapters from* **Book1&2**)

Module II Wave Motion:-

Equation for wave motion, harmonic wave, energy density-Transverses in stretched strings-Modes, Longitudinal waves in rods and gases, Stationary waves (*Relevant chapters from* **Book1&2**)

Module III Harmonic Oscillator:-

Simple harmonic Motion –energy, examples of SHM-Simple Pendulum, loaded spring, Compound Pendulum, Anharmonic oscillator (Qualitative Ideas)-Damped and Forced Harmonic oscillator-Differential equation-Q Factor, (*Relevant chapters from* **Book1&2**)

Module IV Rigid Body Motion:-

Definition, Centre of mass, radius of gyration- Equation of motion of a rotating Rigid body-Angular Momentum, Moment of Inertia-Parallel Axis Theorem, Perpendicular Axis Theorem, Moment of inertia of aThin Rod, Circular Disc, Annular Ring, Cylinder and Sphere (*Relevant Chapters from* **Book1&2**)

Module V Quantum Mechanics:-

De Broglie waves, wave-particle duality, Davisson –Germer experiment, Uncertainty Principle verification.

Particle in a box .Postulates of wave mechanics-time dependent and time independent Schrödinger equation (*Relevant chapters from* **Book3**)

Reference books

1. Mechanics-D.S.Mathur
2. Mechanics – J.C Updhyaya

3. Concepts of Modern Physics –A.Beiser

2C02PHY
ELECTRICITY, MAGNETISM &THERMAL PHYSICS

Semester 2
Hours/week 2
Hours/semester 36
Credit: 2

Module I Electrical Measurements-
Carey Foster bridge-Theory, Determination of Resistance-Potentiometer-theory- Calibration of Ammeter- Calibration of Voltmeter (low & High Range).Conversion of a galvanometer into an ammeter and a voltmeter, Theory of moving coil Ballistic Galvanometer -Damping Correction Current and voltage sensitivities .Comparison between B.G and dead –beat Galvanometers

Module II Transient Currents –
Growth and Decay of current in LR, CR circuit's .Time Constant- LCR Circuit-Resonant frequency

Module III Magnetic Properties of Materials:-
Definition of B, M and H and the relation connecting them- Magnetic Susceptibility and Permeability- Dia-, Para- and Ferro magnetic materials-Properties Anti ferromagnetism and Ferrimagnetism

Module IV Alternating Current:-
AC Fundamentals- Series and parallel Resonance Circuits, Single phase and 3 Phase AC Generators-Theory of Rotating magnetic field, Induction Motor

Module V Introduction:-
Thermal Equilibrium-zeroth law concept of Heat and temperature Thermodynamic processes – Isothermal, Isochoric, Isobaric and Adiabatic processes- Equations-Work done during isothermal, isobaric and isochoric and adiabatic processes- Internal energy and first Law of Thermodynamics applications
of I law, Isothermal and adiabatic elasticity.

Module VI Second law of thermodynamics:-
Heat Engines-efficiency, Carnot cycle-working and efficiency, Second Law of Thermodynamics-Kelvin Plank statement, Refrigerator-COP, Clausius form of II law, equivalence of the two forms, Carnot's Theorem and proof-Thermodynamic scale of temperature

Module VII Entropy:-
Definition-entropy and adiabatics, Change of entropy in Carnot cycle, Change of entropy along Reversible and irreversible paths, Clausius inequality, entropy of a perfect gas, T-S Diagram-Technical Importance- Entropy and Disorder, Third law of Thermodynamics

Reference Books:
1. Electricity and Magnetism-R.Murugeshan
2. Electricity and Magnetism-D.N Vasudeva
3. Heat and Thermodynamics-D.S.Mathur

3C03PHY
OPTICS
Semester: 3
Hours/Week: 3
Hours/ Semester: 54
Credit: 2

Module I: Interference

Introduction– Fresnel's Biprism--Determination of wavelength of light--Interference fringes with white light--Colours of thin films--Interference in a wedged-shaped thin film—Newton's rings—Newton's rings by reflected light--Measurement of wavelength of sodium light by Newton's rings-Determination of refractive index of a transparent liquid.
(Book 1, Ch, 2&3)

Module II: Diffraction

Introduction -- Fresnel and Fraunhofer diffraction -- Difference between interference and diffraction - Fresnel diffraction at a straight edge -- Zone plate -- Construction, theory and action of zone plate -- Fraunhofer diffraction -- Fraunhofer diffraction at a single slit -- theory of diffraction grating -- Determination of wavelength using grating - normal incidence method –comparison of prism and grating spectra . (Book 1, Ch. 4 & 5)

Module III: Polarisation

Introduction -- Double refraction -- Polarisation by Double refraction -- Negative and positive crystals -- principal refractive indices -- Nicol prism -- Production and analysis of polarised light -- Production of plane, circularly and eliptically polarised light -- Optical activity – Specific rotation.
(Book 1, Ch. 7, 8, 9)

Module IV: Laser

Introduction -- Induced absorption – spontaneous emission--induced emission -- Relation between Einstein's A & B coefficients – Principle of lasers -- Ruby laser -- Helium-neon laser – semiconductor lasers -- Properties of laser beam.
(Book 2, chapter 4)

Module V: Raman effect

Discovery--Experimental study of Raman Effect--Quantum theory of Raman Effect--Applications--Laser Raman spectroscopy. (Book 2, Chapter 19)

Module VI: Fibre optics

Introduction -- Structure of optical fibre – classification of optical fibre – plastic fibre – light propagation through an optical fibre – acceptance angle and numerical aperture – dispersion – fibre characteristics - fibre losses - Fibre optic communications
(Book 3, chapter 38)

Books for study

1. Optics and Atomic Physics -- Satya Prakash (Rathan Prakashan Mandir)
2. Modern Physics -- R. Murugeshan& Kiruthiga Sivaprasad (13th edn. 2007) (S.Chand)

3. Basic Electronics – Solidstate -- B.L.Theraja (Edition 2005, S.Chand)

4C04PHY
MODERN PHYSICS AND ELECTRONICS

Semester: 4
Hours/Week: 3
Hours/ Semester: 54
Credit: 2

Module I: Electronics

Single-stage Transistor Amplifiers – classification of amplifiers – CE amplifier – various gains of CE amplifier – Characteristics of a CE amplifier-- Feedback Amplifiers – principle of Feedback amplifiers -- Amplifier with negative and positive feedback -- Advantages of negative feedback amplifiers

Oscillator – the oscillatory circuit - Essentials of a feedback LC oscillator – tuned collector- Integrated Circuits – advantages and drawbacks of ICs – Classification of ICs by function --Linear integrated circuits and digital integrated circuits

(Book 2, chapter 22, 25, 28 & 31)

Module II: Digital Electronics

Introduction – Representation of Binary numbers as electrical signals -- Logic Gates – Universal gates -- Exclusive OR Gate -- Half adder -- Full adder -- Half subtractor

(Book 2, chapter 32 & 33)

Module III: Nuclear physics

Radioactive decay – activity – half-life – Mean lifetime -- Radiometric dating -- Carbon Dating – Geological dating – Nuclear fission -- Chain reaction -- Nuclear reactor -- Breeder reactor –Nuclear fusion in stars.

(Book 3, chapter 12)

Module IV: Astrophysics and Particle physics

Astrophysics – Introduction -- Classification of stars -- The Harward classification system-- H-R diagram -- luminosity of a star -- Stellar evolution -- White dwarfs -- Black holes.

(Book 1 chapter 78)

Elementary particles -- Leptons--Hadrons--Elementary particle quantum Numbers—idea of Quarks (Book 3 chapter 13)

Module V: Material Science

Defects in crystals – Classification of crystal imperfections -- Point defects – vacancies – interstitialcies – impurities – electronic defects -- Line defects – Edge dislocation – Screw dislocation – Surface defects – External and internal surface imperfections -- Volume defects –Effects of crystal imperfection.

(Book 1 chapter 57, 77)

Books for study

1. Modern Physics- R.Murugesan and Kiruthiga sivaprasath (13th Edn. 2007, S.Chand)
2. Basic Electronics-Solidstate--B.L.Theraja (Edition 2005, S.Chand)
3. Concepts of Modern Physics--Arthur Beiser (6th edn) (TMH)

4C05PHY
PRACTICAL
Semester: 1, 2, 3&4
Hours/Week: 2
Credit: 4

1. Flywheel- Moment of inertia
2. Torsion pendulum- Moment of inertia of a disc
3. Young's modulus of the material of bar -Uniform Bending using optic lever
4. Young's modulus of the material of bar – using pin and microscope
5. Viscosity of a liquid- radius using microscope
6. Liquid Lens – Refractive index of a liquid and material of the lens with mercury
7. Liquid Lens –Refractive index of a liquid and material of the lens with another liquid of known refractive index
8. Spectrometer – Refractive index of the material of a prism
9. Spectrometer –Dispersive power of a prism
10. Spectrometer –grating-normal incidence
11. Air Wedge-Diameter of a thin wire
12. Newton's Rings- wavelength of sodium light
13. Deflection Magnetometer- Tan A and Tan B
14. Deflection Magnetometer & Box type vibration magnetometer- m and B0
15. Searle's Vibration magnetometer- moment and m1/m2
16. Circular coil- Determination of m and B0
17. Carey Fosters Bridge- resistance &resistivity
18. Potentiometer- resistance &resistivity
19. Potentiometer- Calibration of low range voltmeter
20. Potentiometer- Calibration of ammeter
21. Lee's disc- Thermal conductivity of a bad conductor
22. Newton's law of cooling- Specific heat of a liquid
23. Full wave Rectifier- study of ripple factor with and without filter
24. Zener diode voltage regulator (Vz given)
25. Voltage multiplier

General Pattern of B.Sc. Physics Core/ Complementary/Open(Theory)Question Paper

Reg. No: Course Code:

Name :

…… Semester ……..Programme

Course Title … … …

Time: 3 Hours Total Weight: 30

Section A

(Multiple choice questions in bunches of four. Each bunch carries a Weightage of 1)

10. Bunch of 4 multiple choice questions

i)

ii)

iii)

iv)

11. Bunch of 4 multiple choice questions

i)

ii)

iii)

iv)

Section B

(Short answer questions. **Eight** questions; Answer any **Six.** Each question carries a weightage of 1)

12. Short answer type question.
13. Short answer type question
14. Short answer type question
15. Short answer type question
16. Short answer type question
17. Short answer type question
18. Short answer type question

10.Short answer type question

Section C

(Short essay/ problem or both. **Twelve** questions; Answer any **Nine.** Each question carries a weightage of 2)

11. Short essay or problem
12. Short essay or problem
13. Short essay or problem
14. Short essay or problem
15. Short essay or problem
16. Short essay or problem
17. Short essay or problem
18. Short essay or problem
19. Short essay or problem
20. Short essay or problem
21. Short essay or problem.
22. Short essay or problem.

Section D

(Long essay questions. **Two** questions; Answer any **One**. Each question carries a weightage of 4)

25. Long essay
26. Long essay

Sd/-

Dr T L Remadevi,

Chairperson, BOS Physics(UG)

KANNUR UNIVERSITY

COURSE STRUCTURE

&

SYLLABUS

FOR

OPEN COURSES

(PHYSICS)

With effect from 2010 Admission

Under

Choice Based Credit Semester System

Scheme and Syllabus- OPEN COURSES (PHYSICS)

No	Semester	Course Code	Title of the Course	Contact hour/week	Credits
1	V	5D01PHY	A. Environmental Physics	2	2
2	V	5D01PHY	B. Applied Electronics	2	2
3	V	5D01PHY	C. The Universe	2	2
4	VI	6D02PHY	A.Non-conventional Energy Sources	2	2
5	VI	6D02PHY	B. Bio Physics	2	2
6	VI	6D02PHY	C. Electricity in life	2	2

5D01PHY (A)
ENVIRONMENTAL PHYSICS
Semester: 5
Hours / Week: 2
Hours / Semester: 36
Credit: 2
Module 1

Force: Concept of force in physics—friction and air resistance—gravity.

Module 2

Energy: Kinetic energy—potential energy—renewable energy—hydroelectric power—wind Power—tides and tidal power—wave power—energy storage—energy in biosphere—Photosynthesis—trophic levels—other biological energy source—biomass energy

Module 3

Heat: Transmission of heat—heat in buildings—heat balance in animals and plants—heat engines—thermal power stations—geothermal power—solar water heaters—radiation—e m spectrum—transmission, absorption and reflection--black body—biological effects of non ionizing radiation—remote sensing.

Module 4

Hydrology and hydrogeology: Hydrological processes—ground water flow—contaminant transport in ground water.

Module 5

The Earths Climate and Climate change: Earth's climate—atmosphere—general circulation of the atmosphere—weather distributions—clouds---ocean currents---ozone layer—the earth's radiative balance, albedo and the 'greenhouse effect'—greenhouse gases and warming potentials— feedbacks and climate impacts—climate modeling—predicting change.

Module 6

Sound and Noise: Sound waves—propagation of sound and acoustics—measuring sound—the decibel, human perception of sound and noise-noise levels-noise measurements-controlling noise.

Module 7

Radioactivity and Nuclear Physics: Types of ionizing radiations—units of radiation measurement—carbon dating—biological impacts of ionizing radiation—radiation doses and dose limits—nuclear safety and nuclear 'incidents'---decommissioning of nuclear facilities—nuclear waste.

Book for Study

1. Environmental Physics----------Clare Smith----------Routledge

5D01PHY (B)
APPLIED ELECTRONICS
Semester: 5
Hours / Week: 2,
Hours / Semester: 36
Credit: 2

Module I- Survey of electronics

Radio Broad casting- Radio Broad cast services- Applications of electronics- Electronic Components, Electronic circuits

Module II- Passive circuit elements and their applications

Resistors, types, colour code, series and parallel combinations, voltage divider circuits- inductors- self inductance, mutual inductance- resistance offered by a coil- transformers, capacitors- types, capacitance, colour code, series and parallel combinations,variable capacitors, ganged capacitors, Qualitative study of series and parallel RLC circuits- Radio tuning- Low pass- high pass- Band pass filters, Time constant of LR and RC circuits

Module III-Solid state devices

Junction diode, zener diode, Led, Transistors, Field effect transistors, SCR, Diac, Triac, IC

Module IV-Application of Solid state devices

Half and full wave rectifiers- Filters- Zener Voltage regulators- Biasing of transistors- Transistors as a switch- Amplifiers- Effect of negative feed back in amplifiers- Oscillators- Operational amplifiers – inverting and non- inverting amplifiers

Module V-Digital fundamentals

Logic gates- OR, AND, NOT, XOR, NOR, NANDgates- Universal gates- Binary numbers- Decimal to Binary conversion and Binary to decimel conversion- BCD numbers – BCD to seven segment LED decorder- Seven segment display

Module VI-Electronic instruments

Analog and Digital votmeters- Analog and Digital multimeters- cathode Ray oscilloscope- signal generators

Module VII-Activity

Soldering Practice- Construction and trouble shooting of rectifiers – Zener regulators- transisor amplifiers- Amplifier using IC LM 741, NE 555 IC Astable multivibrator circuit- Voltage regulator using 723 IC

Books for study:

1. Basic Electronics- Sold state-B L Therja(S Chand)
2. Basic electronics- Bernard Grob (TMGH)
3. Electronic lab manual- K A Nawas (Rajah publishers)

Books for reference

1. Basic electronics and linear circuits- N N Bhargava, DC Kulshreshtha, S C Gupta(TTTI, Chandigarh)
2. Principles of Electronics-V K Mehta, Rohith Mehta (S Chand)

5D01PHY(C)
THE UNIVERSE
Semester: 5
Hours / Week: 2
Hours / Semester: 36
Credit: 2

Module I Historical Perspectives: (4 Hrs)

Indian Astronomy: Contributions of Aryabhata, Varahmihira, Brahmagupta, Bhaskaracharya and other Indian Astronomers, Western Astronomy: Contributions of Copernicus, Tycho Brahe, Kepler, Galileo, Newton, Einstein and Hubble.

Module II Astronomy (6 Hrs)

Difference between Astronomy & Astrology, Fascination of Astronomy, Important branches of Astronomy -Observational Astronomy: Constellations, Star charts and instrumentation - Zodiacal constellations, Planetary position chart (Grahanila) – as a method of marking time of an event. Solar system, Stars and star clusters, Molecular Clouds, Galaxies and Clusters of Galaxies, intergalactic medium

Module III (World around Us) (10 Hrs)

Sun as a star- Solar parameters, Solar Constant, Solar Spectrum, Mechanism of Energy Production, Solar system – Facts & Figures, Origin of Solar system, briefideas of planets – Asteroids, Comets, Meteor

Moon-Our nearest neighbor Facts & Figures, Orbit, Moon's , rotation, Physical features, Moon's retardation, Introduction to Year, month & Calendars. India's moon exploration

Module-IV Galaxies & Expanding Universe (16 Hrs)

Dimensions, size & shape of Milky Way, Spiral Structure, Elliptical galaxies, Spiral Galaxies, Evolution of Galaxies. Population of Stars, Clusters of Stars –Galactic & Globular. Local group, Cluster of Galaxies, Hubble'sclassification, Red shift Distance relation, Normal Galaxies, Origin and evolution of Galaxies. Large scale structure of the universe – isotropic and homogeneity - Expanding universe – Doppler effect – red shift – distance scale –Hubble law. Big bang theory , cosmic microwave background and its discovery ; early universe – inflationary model of the universe – age of the universe and its determination

References

1. ASTROPHYSICS (J.V. Narlikar, R.J. Tayler, W. Davidson and M.A. Ruderman)
W.A. Benjamin, London, 1969

2 THE STRUCTURE OF THE UNIVERSE J. V. Narlikar
Oxford University Press, Oxford, 1977

3 VIOLENT PHENOMENA IN THE UNIVERSE
J.V.Narlikar, Vigyan Prasar, New Delhi

4 INTRODUCTION TO COSMOLOGY (2nd Edition)
J.V.Narlikar, Vigyan Prasar, New Delhi

5 A JOURNEY THROUGH THE UNIVERSE J.V.Narlikar
National Book Trust's Nehru Bal-Pustakalaya, New Delhi, 1986

6 THE BIRTH OF OUR UNIVERSE- Isaac Asimov, Richard Hantula

7 THE UNIVERSE IN A NUTSHELL - Stephan william Hawking

8 THE SKY Astronomy Software Student Edition

9 CELESTIA - 3D space simulation open software for Linux/Windows

10 THE SKYX STUDENT SOFTWARE EDITION .With this software you can interactively learn about the universe

11 INDIA IN SPACE Vigyan Prasar, New Delhi CD ROM

6D01PHY (A)
NON- CONVENTIONAL ENERGY SOURCES
Semester: 6
Hours / Week: 2
Hours / Semester: 36
Credit: 2

Module I

Solar energy: Solar constants, solar radiation measurements, solar energy collector, Physical principle of the conversion of solar radiation in to heat, Solar energy storage, solar heaters, solar ponds, solar cookers, solar distillation, solar furnaces, solar green houses, photovoltaic generation. Basic merits and demerits of solar energy

Module II

Wind energy: Basic principle of wind energy conversion, basic components of wind energy conversion system, wind energy collectors. Energy storage, application of wind energy

Module III

Geothermal energy and energy from biomass: Geothermal sources, hydrothermal sources, geopressured resources, advantages and disadvantages of geothermal energy over other energy forms, application of geothermal energy. Method of obtaining energy from biomass

Module IV

Energy from Oceans and Chemical energy resources: Ocean thermal electric conversion. Basic principle- tidal power, advantages and limitation of tidal power generation- Energy and power from waves, wave energy conversion devices

Fuel cells and application of fuel cells, batteries, advantages of battery for bulk energy storage- Hydrogen as alternative fuel for motor vehicles

Text books

1. Non – Conventional Energy Resources by G. D. Rai, Khanna Publishers, 2008.

2. 2. Solar Energy Fundamentals and application by H.P. Garg and J. Prakash, Tata McGraw- Hill Publishing company ltd, 1997.

3. Solar energy by S. P. Sukhatme, Tata McGraw- Hill Publishing company ltd, 1997.

4. Solar energy by G.D. Rai, 1995.

References

1. Energy Technology by S. Rao and Dr. B.B. Parulekar, 1997, 2nd edition

2. Power Technology by A. K. Wahil. 1993.

6D02PHY (B)
BIOPHYSICS
Semester: 6
Hours / Week: 2
Hours / Semester: 36
Credit: 2

Module-I: Bio-mechanics

Muscles, types of muscles- striated, cardiac, phasic tonic muscles, properties of muscles - Excitability, conductibility, contractability, extensibility, tonicity- Structure of striated muscles- Energy for contraction of muscles- Bio-mechanics in vertebrates-Newton's laws, centre of mass. Bio-mechanical analysis of movements of snakes-Bio mechanical analysis of swimming fishes, Aerodynamic basis of flights. (Book 1, Chapter 12)

Module-II: Radiation Biophysics

Ionizing radiation-Excitation/ionozation- radiation sources- Interaction of radiation with matter- Energy transfer processes- Measurement of radiation-Radioactive isotopes- Applications of radioactive tracers- Biological effects of radiation- Dose response relationships- Effects of radiation on living systems-Radiation protection and radiation therapy (Book 2- Chapter 15)

Module-III: Bio-medical Instrumentation

Basic principle of lasers and its medical applications.Qualitaive ideas of ECG, VCG, EEG, NMR imaging, CT scan and Ventillators (Book 3 and Book 4)

Book for study and reference

1. Introduction to Bio- Physics- Pranab Kumar Banerjee (S Chand)
2. Essentials of Biophysics – Prof. P Narayanan (New age International)
3. Hand book of Biomedical instrumentations- R S Khanpur (Tata MacGraw Hill)
4. Lasers- Ghatak and Thaygarajan
5. Medical Bio- Physics – R N Roy

6D02PHY (C)
ELECTRICITY IN LIFE
Semester: 6
Hours / Week: 2
Hours / Semester: 36
Credit: 2

Module –I

Ohm's law, resistances in series and parallel, Joule's law of electrical heating- Horse power, KW-hour(unit), capacitances in series and parallel, Different types of capacitors, Charging and discharging of capacitors.

Module-II

Faraday's laws of electromagnetic induction, self inductance of a coil, mutual induction- Growth and decay of current in an inductance circuit- transformers, batteries, Trickle charge, Lead acid cells, Nickel Cadmium batteries, Solar cells, diodes, rectifiers, eliminators

Module-III

Measuring instruments, Moving coil galvanometer, Ammeter, Voltmeter, Multimeters

Module-IV

House wiring(single phase and three phase), fuses, Miniature circuit breaker(MCB), Earth Leakage Circuit Breaker(ELCB), Wires and Cables, Earthing, Care in handling electrical appliances, First aid for Electrical shock

Module-V

House hold appliances- Fuse, Pedestal and ceiling fans, Single phase motors, Reciprocating pump, Electric iron, Water heater, invertors, UPS

Book for study:

1. B L Theraja- A Text book of Electrical Technology(S Chand)
2. K P Anwer- Domestic Appliances Servicing (Scholar, Thalassery)

General Pattern of B.Sc. Physics Core/ Complementary/Open(Theory)Question Paper

Reg. No: **Course Code:**

Name:

…… Semester ……..Programme

Course Title … … …

Time: 2Hours **Total Weight: 20**

Section A

(Multiple choice questions in bunches of four. Each bunch carries a Weightage of 1)

Bunch of 4 multiple choice questions

1. i)
   ii)
   iii)
   iv)
2. Bunch of 4 multiple choice questions
   i)
   ii)
   iii)
   iv)

Section B

(Short answer questions. **Ten** questions; Answer any **Six.** Each question carries a weightage of 1)

3. Short answer type question.
4. Short answer type question
5. Short answer type question
6. Short answer type question
7. Short answer type question
8. Short answer type question
9. Short answer type question
10. Short answer type question
11. Short answer type question
12. Short answer type question

Section C

(Short essay/ problem or both. **eight** questions; Answer any **four.** Each question carries a weightage of 2)

13. Short essay or problem
14. Short essay or problem
15. Short essay or problem
16. Short essay or problem
17. Short essay or problem
18. Short essay or problem
19. Short essay or problem
20. Short essay or problem

Section D

(Long essay questions. **Three** questions; Answer any **One**. Each question carries a weightage of 4)

21. Long essay
22. Long essay
23. Long essay

Sd/-

Dr T L Remadevi,

Chairperson, BOS Physics(UG)