KANNUR UNIVERSITY

(Abstract)

B.Sc Physics Programme-Scheme & syllabus of Core,Complementary and Open Courses under Choice Based Credit Semester System for Under Graduate Programme-implemented with effect from 2009 admission-Orders Issued.

ACADEMIC BRANCH

U.O.No.Acad/C2/302/2007 Dated, K.U.Campus. P.O,10-07-2009.

Read: 1.Minutes of the meeting of the Board of Studies in Physics (UG) held on 25-05-2009.
2. Minutes of the meeting of the Faculty of Science held on 16-06-2009.
3. U.O No.Acad/C2/3838/2008 (i) dated 07-07-2009
4. Letter dated 9-06-2009 from the Chairman, BOS in Physics (UG).

ORDER

1.The Board of Studies in Physics (UG) vide paper read(1) above has prepared, finalized and recommended the Scheme and Syllabus of Core,Complementary and Open Courses under Choice Based Credit Semester System for implementation from 2009 admission.

2. The recommendations of the Board in restructuring the syllabus is considered by the Faculty of Science vide paper read (2) and recommended for the approval of the Academic Council.

3. The Regulations for Choice based Credit Semester System is implemented in this University vide paper read (3).

4. The Chairman, BOS in Physics (UG) vide paper read (4) forwarded the restructured scheme and syllabus of Core,Complementary and Open Courses under Physics Programme prepared in line with Choice Based Credit Semester System, by the Board of Studies in Physics (UG) for implementation with effect from 2009 admission.

5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction ***to implement the scheme and syllabus of Core,Complementary and Open Courses of B.Sc Physics Programme restructured in line with Choice Based Credit Semester System,with effect from 2009 admission***, subject to ratification by the Academic Council.

6. The restructured scheme and syllabus of Core,Complementary and Open Courses of B.Sc Physics Programme under Choice Based Credit Semester System, implemented with effect from 2009 admission is appended.

7. The Scheme and Syllabus of Complementary Courses offered for this Programme will be available along with the syllabus of Core Courses of the Complementary subject.

8. The affiliated Colleges are not permitted to offer Complementary Courses in violation to the provisional/permanent affiliation granted by the University. Changes in Complementary Courses are permitted with prior sanction /revision in the affiliation order already issued in this regard.

9. If there is any inconsistency between the Regulations for CCSS and its application to the Scheme & Syllabus prepared, the former shall prevail.

10. Orders are issued accordingly.

Sd/-
REGISTRAR

To:
1. The Principals of Colleges offering B.Sc Physics Programme.
2. The Examination Branch (through PA to CE)

Copy To:
1. The Chairman, BOS Physics (UG)
2. PS to VC/PA to PVC/PA to Regr
3. DR/AR I Academic
4.Central Library 5. SF/DF/FC.

Forwarded/By Order

SECTION OFFICER

Appendix to U.O No Acad/C2/302/2007 dated 10-07-2009.

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 2009 admission

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 –C++ Programming	2	36	2
5	Core Practical I	2	36	---
6	Complementary I (Course I)	4	72	3
7	Complementary II (Course I)	4	72	3

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 – Methodology of Science	2	36	2
5	Core Practical I	2	36	-
6	Complementary I (Course II)	4	72	3
7	Complementary II (Course II)	4	72	3

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	3

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	3
6	Complementary II (Course IV)	5	90	3

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 will be decided by the Board of Studies concerned.

SCHEME-PHYSICS(Core)

No	Semester	Course Code	Title of the Course	Contact hour/week	Credits
1	I	1B01PHY	C++ Programming	2	2
2	II	2B02PHY	Methodology of Science (Physics)	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	Credits
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	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

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	VI	6D02PHY	A. Non-conventional Energy Sources	2	2
4	VI	6D02PHY	B. Computer Applications	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 a 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	1
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 submits 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 course. The CE of project will be done by the teacher guide and ESE by the examiners deputed for practical examination. The project evaluation details will be decided by the Practical Examination Board.

Sd/-
M.Vijayan
Chairman, BOS Physics (UG)

CORE I 1B01PHY C ++ PROGRAMMING

Semester : I
Hours/ Week : 2
Hours/ Semester : 36
Credit : 2

Module I

Character set- Tokens- Keywords – Identifiers and Constants- Basic Data Types- Enumerated data type – Constants (integer constants-real constants-single character constants- string constants-backslash 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 expressions- 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 (goto – break - continue statements)

Simple Programs

Fahrenheit-Celsius conversion, Slope of a line given its end points-, Focal length of a lens using lens makers formulae, 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.

Module II

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.

Functions in C++

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

Module III

Object Oriented Programming

Basic Concepts of OOP(classes- objects-data abstraction and encapsulation- inheritance-polymorphism) - Advantages of OOP.

Classes and Objects

Class declaration- Class function definition- Creating objects- Accessing class members-Defining member functions- Scope resolution operator- Operator over loading.

Module IV

Fundamentals of graphics- Setting scales for graph- plotting of line, circle, rectangle ellipse and arc – Simulation of 1.Radioactive decay law. 2. The variation of d with the angle of the prism and refractive index of the material of the prism 3. Field along the axis of a coil

Book for Study: Object Oriented Programming with C++ by E Balgurusamy.
Graphics Under C++ by Yashwant Kanetkar

Books for reference:
Introduction to Oriented Programming with C++ by Yashwant Kanetkar
ANSI C by E Balagurusamy
Computer Science with C++ by Sumita Arora

CORE II 2B02PHY METHODOLOGY OF SCIENCE

Semester : II
Hours/ Week : 2
Hours/ Semester : 36
Credit : 2

Module I – Science and Science Studies
Types of knowledge: Practical, Theoretical, and Scientific knowledge; Information.What is Science; what is not science; laws of science. Basis for scientific laws and factual Truths; Science as a human activity, scientific temper, empiricism, vocabulary of science, science disciplines. Revolution in science and Technology.

Module II – Methods and tools of science
Hypothesis: Theories and laws in science. Observations, Evidences and proofs. Posing a question; Formulation of hypothesis; Hypothetico-deductive model, Inductive model. Significance of verification (Proving), Corroboration and falsification (disproving), Auxiliary hypothesis, Ad-hoc hypothesis.Revision of scientific theories and laws, Importance of models, Simulations and virtual testing,Mathematical methods vs. scientific methods. Significance of Peer Review.

Reference Books:
1. Gieryn, T F. Cultural Boundaries of Science., Univ. of Chicago Press, 1999
2. Collins H. and T Pinch., The Golem: What Everyone Should Know About Science., Cambridge Uni. Press, 1993
3. Hewitt, Paul G, Suzanne Lyons, John A. Suchocki & Jennifer Yeh, Conceptual Integrated Science. Addison-Wesley, 2007
4. Newton R G. The Truth of Science: New Delhi, 2nd edition
5. Bass, Joel E and et. al. Methods for Teaching Science as Inquiry, Allyn & Bacon, 2009.

Module III: Methodology and Perspectives of Physics
Design of an experiment , experimentation , Observation, data collection; Need for mathematical language for physics- scientific imagination and the need for rigorous experimental evidence- Role of invention of new Scientific instruments- Electronic computer as one of the greatest tools for combination of mathematics and physics –- interaction between physics and life science – interaction between physics and technology.

References:
1. A brief history and philosophy of Physics - Alan J. Slavin- http:/ www.trentu. Ca/ academic / history- 895 .html
2. The inspiring History of Physics in the Last One Hundred Years : Retrospect and prospect Prof. Dr-lng . Lu Yongxiang http :// www.twas .org.cn/twas/proLu.asp
3. Attitude of teachers towards physics and paranormal phenomena, HenrykSzyd Lowsky- www.conceptsofphysics. net/IV -4-685.pdf

Module IV: The Heritage of Physics
Classical vs Modern Physics- First period; Earliest Times- Second Period; rise of the experimental method- Third Period; the rise of Classical Physics

References:
Introduction to Modern Physics – Sixth Edition- F.K. Ritchmeyer, E.H. Kennard and John N Cooper, TMH Publishing Company, New Delhi.

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 a 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 resonance-superposition 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 space-time.

(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 Diffraction.

Single 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

The nature of polarized light – linear, circular and elliptical polarization – polarizers- Malus's law – dichroism – dichroic crystals – Polaroid - birefringence – calcite – birefringent crystals – birefringent polarizers – scattering and polarization – polarization by scattering – polarization by reflection – retarders – the full wave plate, half wave plate and quarter wave plate – optical activity- photo elasticity-Faraday effect –Kerr and Pockel effect – liquid crystals – mathematical description of polarization – the Stokes parameters – the Jones vectors – the Jones and Mueller matrices.

(Book 2, Ch 8)

Books for Study

1. Optics – II Edn – Ajoy Ghatak – TMH Publishing Co.
2. 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(Object oriented programming)
23. Program in C^{++} -To solve Quadratic Equation(Object oriented programming)
24. Program in C^{++} -To find the transpose of a matrix(Object oriented programming)

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 cycle-efficiency-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)

Module VI Statistical Physics.
Concept of probability. Thermodynamic probability .Boltzman's Theorem on Entropy and Probability. Phase space, Partition function. MB, BE, FD Distributions (Derivation not required) Black body radiation, Planks radiation formula (Qualitative)-Stefan's law from Plank's formula. Dying stars (Qualitative) (Ch. 9- Book3,Ch.12-Book1)

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 1: Crystal Geometry.

Crystal lattices- Crystal Planes- miller Indices,- Unit cells- Typical Crystal Structures, symmetry elements in Crystals- co-ordination numbers- packing fraction- Symmetry groups.

Module 2: Crystal Bonding.
Different types of bonding in Crystals- ionic bond- covalent bond- metallic bond- hydrogen bond- Vander Waals bond.

Module 3: Crystal Diffraction.
X-ray diffraction by a crystal lattice- Laue formation of X-ray diffraction- Laue spots- Bragg's law- Reciprocal lattice – its properties- Bragg's X-ray Spectrometer- Powder Crystal method- Rotating Crystal method.

Module 4: 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.

Module 5: Electrical properties of Solids.

Drude's Theory- Classical free electron theory- Density of states- Fermi level- Origin of Band gap- Classification based on Band gap- Electrical conductivity in metals and in semiconductors.

Module 6: Superconductivity.

Zero Resistivity- Critical Temperature- Meissner effect- Isotope effect- type I and II superconductors- BCS theory- Josephson's effect- High temperature T_c- Applications.

References:

1. Sold State Physics- M A Wahab (Narosa)
2. Sold State Physics-S O Pillai
3. Sold State Physics – A J Dekkar
4. Introduction to Solids- Leonid V Azaroff(TMH)
5. Sold State Physics – H C Gupta(Vikas publishing House)
6. Introduction to Solids- Ali Omar

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.
Frequency response -Single stage CE amplifier- Capacitor coupled and Direct coupled two stage amplifiers -Audio power amplifiers - Transformer coupled Class A, Class B and Class AB amplifiers, Class C tuned amplifier.

Module 5: Feed back in Amplifiers.
Series voltage negative feed back-advantages-Different types of feed back.

Module 6: Operational Amplifiers
Integrated circuit operational amplifiers- Voltage follower, Inverting ,Noninverting, Summing and Differential amplifier circuits using OP-AMPS. OP-AMP Differentiator and Integrator.

Module 7: Signal generators
Concept of positive feed back-Barkhausen criterion-Phase shift, Hartley, Colpittts and Wien bridge Oscillators

Module 8: Power supplies.
DC Power Supply using Full- wave rectifiers, capacitor filter and Zener regulator – Power supply performance-Transistor Series regulator.

Books for study
1. 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.

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.

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.

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

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.

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
3. 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 –Gauge transformations –Coulomb Gauge & Lorenz gauge (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 –Ink- jet printer –Sorting of minerals – Electrostatic generator-Electrostatic voltmeter –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 transformer – 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

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: Photon devices.
Photoemissive devices – photomultipliers (speed of response, dark current, shot noise) – photon counting techniques – image intensifiers – photoconductive detectors – detector arrays. (Book 4)
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Module 5 : Optical devices.
Compact disc – description – the encoding scheme – optics of reading a compact disc – correction of tracking – correction of focus – DVD – the confocal microscope - resolution – depth of focus. (Book 5)

Book for Study

1. Optics – II Edn - Ajoy Ghatak - TMH Publishing Co.
2. Lasers Theory and Applications - K. Thyagarajan and AK Ghatak – Macmillan India
3. Optical Electronics - Ajoy Ghatak and K. Thyagarajan – Cambridge
4. Optoelectronics an Introduction – II Edn – J. Wilson, J F B Hawkes – Prentice Hall
5. Modern Classical Optics – Geoffrey Brooker – Oxford Uty Press

CORE XIII 6B13PHY QUANTUM MECHANICS

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

Module 1: The Limits of Classical Physics.
Black body radiation – Photoelectric effect – Compton effect wave properties and electron diffraction – The Bohr atom – The wave – particle problem. (Book .1. Chapter1)

Module 2: Wave Packets and the Uncertainty Relations.
Localized wave packets – The propagation of wave packets. From wave packets to the Schrödinger equation – uncertainity relations. (Book 1 Chapter 2)

Module 3: The Schrodinger Wave Equation and the Probability Interpretation:-
The Probability interpretation – The Schrodinger equations for a particle in a potential –
(Book 1 Chapter 3)

Module 4: Eigen Functions and Eigen Values.
Eigen value equations- Eigen value problem for a particle in a box. The expansion postulate and its physical interpretation. Momentum eigen function and the free particle.
(Book 1 Chapter 4)

Module 5 : One Dimensional Potentials.
The potential step – The potential well – The potential barrier – The Harmonic oscillator.
(Book 1 Chapter 5)

Book for study
1. Quantum physics – Stephen Gasiorowicz (John Wiley & Sons,Inc)

Book for reference.
1. Concepts of Modern physics – Arthur Beiser (John Weily & Sons Inc)
2. Modern Physics – Kenneth S.Krane (John Weily & 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 method- photoelectric method- various magnitude systems- the visual system-photographic system- photoelectric 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 3chap 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-glory-mirage-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

Scope of the Science of materials - Review of atomic structure – interactions and bonds- Classification of materials and their properties- Crystalline and non-crystalline- Inorganic solids- ionic Solids- polymers- metals and alloys.

Module 2 Defect and Diffusion in Materials
Point Defects- line defects- surface defects- volume defects- Production and removal of defects- Deformation- irradiation- quenching- annealing- recovery- recrystallisation and grain growth.Diffusion in solids- Fick's law- Inter diffusion and Kirkendall effect.

Module 3 Vacuum pumps and Gauges
High vacuum production – Rotary pump –diffusion pump –High Vacuum system- Bel Jar Vacuum system- leak detection – Pilani & Penning Gauge- ionization Gauge.

Module 4 Growth Techniques
Thin film preparation- Physical methods-Vacuum Evaporation – Electron Beam evaporation – Flash Evaporation – Sputtering- DC sputtering- Ion Beam sputtering- Chemical methods- Electro deposition- electro plating- Chemical bath – Spray Pyrolysis.

Methods of Crystal Growth – solution growth techniques.

Module 5 Material Characterization Techniques
Structural Analysis- XRD methods- Scanning Electron Microscope-Tunneling Electron Microscope- Compositional Analysis- electron scanning for Chemical analysis- Optical Analysis- Spectro photometer- electrical analysis- Hall set up- Four Probe set up.

References

1. Materials science and engineering- V Edn- V Raghavan(PHI)
2. Introduction to Materials science and engineering – Ralls Cartney and Wolf (Wiley)
3. Thin film Phenomena- K L Chopra(McGraw Hill)
4. Handbook of Thin film technology –Meissel& Clang

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 numbers-frequency 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 a 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 a 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

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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/-
M.Vijayan,
Chairman,BOS Physics(UG)

KANNUR UNIVERSITY

SCHEME & SYLLABUS

PHYSICS (COMPLEMENTARY)

With effect from 2009 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 circuits .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-nenon 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 oscillator - Hartley oscillator.

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 a 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(V_z 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/-
M.Vijayan,
Chairman,BOS Physics(UG)

KANNUR UNIVERSITY

COURSE STRUCTURE

&

SYLLABUS

FOR

OPEN COURSES

(PHYSICS)

With effect from 2009 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	Environmental Physics	2	2
2	V	5D02PHY	Applied Electronics	2	2
3	VI	6D01PHY	Non-conventional Energy Sources	2	2
4	VI	6D02PHY	Computer Applications	2	2

5D01PHY 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

6D01PHY 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, geo-pressured 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.

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)

19. Bunch of 4 multiple choice questions
i)
ii)
iii)
iv)
20. 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)

21. Short answer type question.
22. Short answer type question
23. Short answer type question
24. Short answer type question
25. Short answer type question
26. Short answer type question
27. 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)

27. Long essay
28. Long essay

Sd/-
M.Vijayan,
Chairman,BOS Physics(UG)

KANNUR UNIVERSITY

(Abstract)

B.Sc Physics Programme- syllabus of Course '2BO2PHY Methodology of Science' under Choice Based Credit Semester System-***Modified*** with effect from 2009 admission-Implemented -Orders Issued.

ACADEMIC BRANCH

No.Acad/C2/302/2007(1) Dated, K.U.Campus. P.O, 04-12-2009.

Read: 1.U.O.No Acad/C2/307/2009 dated 10-07-2009.
2. Minutes of the meeting of the Board of Studies in Physics (UG) held on 24-11-2009.
4. Letter dated 26-11-2009 from the Chairman, BOS in Physics (UG).

ORDER

1. As per paper (1) above, the Scheme and Syllabus of B.Sc Physics Programme (Core, Complementary and Open Courses) under Choice Based Credit Semester System is implemented in this University with effect from 2009 admission.

2. As per paper read (2) above, the Board of Studies in Physics (UG) recommended to modify the syllabus of '2B02PHY Methodology of Science' Course of II Semester B.Sc Physics Programme, implemented under Choice based Credit Semester System with effect from 2009 admission.

3. The Chairman, BOS in Physics (UG) vide paper read (3),has forwarded the modified syllabus of '2B02PHY Methodology of Science' Course of II Semester B.Sc Physics Programme as per the recommendation of the Board of Studies in Physics (UG), for implementation with effect from 2009 admission.

4. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction ***to implement the modified syllabus of '2B02PHY Methodology of Science' Course of II Semester B.Sc Physics Programme, forwarded by the Chairman, with effect from 2009 admission,*** subject to report to the Academic Council.

5. The modified syllabus of '2B02PHY Methodology of Science' Course of B.Sc Physics Programme, implemented with effect from 2009 admission is appended.

6. The Core Course '2B02PHY Methodology of Science' implemented and communicated vide U.O read(1) above is replaced.

7. Orders are issued accordingly.

Sd/-

To: REGISTRAR

The Principals of Colleges offering B.Sc Physics Programme.

Copy To:

1. The Chairman, BOS Physics (UG)
2. The Examination Branch (through PA to CE)
3.PS to VC/PA to PVC/PA to Regr
4. DR/AR I Academic
5.Central Library
6. SF/DF/FC.

Forwarded/By Order

SECTION OFFICER

Appendix to U.O.No Acad/C2/302/2007(1) dated 04-12-2009.

CORE II – 2B02PHY- METHODOLOGY OF SCIENCE

Hours/Week : 2
Hours/Semester : 36
Credit : 2

Module 1: History of Science

Introduction-Origins of Scientific Enquiry- European Origins of Science- Contributions of Early India- Science in the Middle Ages- Newton and After

(Book1- Ch.1,2,3,4,7&8)

Module 2- Philosophy of Science

What is Science- Areas of Science-Basic and Applied research-Why Understand Science?- Scientific Statements- Scientific Methods-Recent Developments in Philosophy of Science

(Book 2- Ch 1,2)

Module 3- 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 (Book2- Ch 3,7)

Module 4- Beginning of Modern Physics

The New Atom-From X-rays to the Nucleus-The New Universe-Einstein and Relativity-The Quantum Surprise-New Observation of the Universe (Book3 Ch.1,2,3,4)

Books for Study

Book1: R.V.G. Menon, An Introduction to the History and Philosophy of Science-Pearson Education
Book2: Jeffery A Lee, The Scientific Endeavour, Pearson education
Book 3: Ray Spangenburg & Diane K Moser, The History of Science from 1895 to 1945-Universities Press(India) Ltd. 1999

Books for Reference

1. Roger G Newton, The Truth of Science, Harvard University Press
2. Harry Collins & Trevor Pinch, The Golem- What Everyone should Know about Science, Cambridge University press,
3. Gieryn T F, Cultural Boundaries of Science, University of Chicago Press
4. Hewitt et. al., Conceptual Integrated Science, Addison-Wesley
5. Bass, Joel et.al., Methods of Teaching Science as Inquiry, Allyn & Bacon

Sd/-
M.Vijayan,
Chairman,BOS Physics(UG).

KANNUR UNIVERSITY

(Abstract)

B.Sc Physics Programme– Model Question Papers for I Semester (Core and Complementary Courses) effective from 2009 Admission – Implemented – Orders issued.

ACADEMIC BRANCH

U.O.No.Acad/C2/302/2007. Dated, K.U.Campus.P.O, 13-10-2009.

Read: 1. U.O.No.Acad/C2/3838/2008 (i) dated 07-07-2009.
2. U.Os No.Acad/C2/302/2007 dated 10-07-2009.
3. Letter dated 10-08-2009 from the Chairman, Board of Studies in Physics (UG).

O R D E R

1. As per the paper read first above,Choice Based Credit Semester System is introduced in this University with effect from 2009 admission.

2. As per the paper read second above, the Scheme and Syllabus of B.Sc Physics Programme (Core and Complementary Courses) under this scheme are implemented in this University.

3. As the paper read third above, the Chairman, Board of Studies in Physics (UG) has forwarded the Model Question Papers for I Semester B.Sc Physics(Core & Complementary Courses) for implementation with effect from 2009 admission, under Choice Based Credit Semester System .

4. The Vice-Chancellor, after considering the matter in detail, and in exercise of the powers of the Academic Council, as per Section 11 (1) of Kannur University Act, 1996 and all other enabling provisions read together with, has accorded sanction ***to implement the following Model Question Papers for I Semester B.Sc.Physics Examinations under CCSS, submitted by the Chairman, Board of Studies in Physics (UG) with effect from 2009 admission,*** subject to report to the Academic Council.

i) Physics Core – 1B01 PHY C ++ Programming.
ii) Physics Complementary -1C01 PHY Mechanics

5. The Model Question Papers are appended.

6. Orders are therefore issued accordingly.

Sd/-
REGISTRAR

To:

1. The Principals of Colleges offering Physics Programme.
2. The Examination Branch (through PA to CE).

Copy to:

Forwarded/By Order

1. The Chairman, Board of Studies in Physics (UG).
2. PS to VC/PA to PVC/PA to Registrar.
3. DR/AR-I (Academic). SECTION OFFICER
4. SF/DF/FC

Appendix to U.O No Acad/C2/302/2007 dated 13-10-2009.

Reg.No:……
Name:-------

First Semester Physics Programme

Core 1- 1B01PHY C++ Programming

Time 3hrs Total weight: 30

Section A

(Choose the correct answer; each bunch carries a weightage of 1)

1. i)Which header file is needed for clrscr()
   A) conio.h B) iostream.h C) Math.h D) graphic.h
   ii) Members of a class are by default
   A) Public B) private C) inline D) protected
   iii)int a, b=2, k=4;
   a = b* 3/4 + k/4 + 8- b+ 5/8; Then a =
   A) 9.125 B) 8.125 C) 8 D) 9
   iv) x = ++y + 2*y ; If y = 6 Then x is
   A) 6 B) 18 C) 21 D) 19
2. i) Which of the following array declaration is incorrect
   A) float value[10]; B) char name[20]; C) int mat[10][10]; D) double[50];
   ii) Which of he following is a valid identifier?
   A) data_rec B) _data C) 1data D) my.file
   iii) Which one is not an integer data type?
   A) Char B) int C) short D) float
   iv) if (a<b)
   n=a;
   else
   n=b;
   which of the following is correct
   A) n=((a<b) ? a:b); B) n=(a<b) ? a:b); C) n=((a<b) ? a=b); D) n=((a>b) ? a:b);

Section B

(Answer any six. Each question carries a weightage of 1)

3) What are keywords? Name any two keywords in C++
4) Give the syntax of a do – while loop
5) What is the significance of 'break' statement in a switch statement?
6) What is function overloading?
7) What is type conversion?
8) Write the function required to draw a circle and explain the symbols
9) Why is character constants treated as integer constants as well?
10) 'Function prototyping is one very useful feature of C++ function.' Explain.

Section C

(Answer any nine questions. Each question carries a weightage of 2)

11) #include <iostream.h>

```
{
 int a=5;
 cout<<a<<"\n";
 cout<<::a;
 }
```

Write the output of the above program.

12) Differentiate between call by value and call by reference.
13) What is the difference between a structure and union?
14) Draw the logic of program flow in a switch block
15) Describe the major parts of a C++ program.
16) Write a program to a 10 X 10 square of asterisks.
17) Write a program to find the current when resistances R1 and R2 are connected either in series or parallel.
18) Write a program to read a square matrix and displace its transpose.
19) Write a program to evaluate factorial of a number by recursion.
20) Explain the concept of device drivers? What is the meaning of gd=DETECT in a C++ program.
21) Define a class with three integer data members. Provide member functions to read and display them.
22) Write equivalent C++ expressions for the following expressions.
i) $\sqrt{}$ sin a + tan^{-} a – e^{2x} ii) $[(3x+5y) \div (5x+3y)]^{3/2}$ iii) $e^{! 2x-4x!}$ iv) $v^{2 =} u^2 + 2as$

Section D

(Answer any one question. Each question carries a weightage of 4)

23) What is an operator? Discuss important operators in C++ with examples.
24) Discuss the basic concepts of OOP (object oriented programming).

Sd/-
M.Vijayan,
Chairman,BOS Physics(UG).

Model Question Paper

Reg.No…….

Name …….

Course code: 1C01PHY **MECHANICS**

Time 3 hours *Total Weight 30*

Section-A

(Choose the correct answer; each bunch carries a weightage of 1)

1. i) The isothermal elasticity of an ideal gas is
   a) P b) V c) 1/P d) 1/V
   ii) Period of torsional oscillation is …
   a) directly proportional to I b)Inversely proportional to L
   c) inversely proportional to square root of n d) directly proportional to square root of r
   iii) For a harmonic oscillator, acceleration is proportional to
   a) Velocity b) –displacement c) (velocity)^2 d) (displacement)^2
   iv) According to the principle of uncertainty, angular momentum and… of a particle cannot be simultaneously measured accurately.
   a) Momentum b) time c) angular position d) torque
2. i)The equation representing a wave propagating in negative x-direction
   a) f (t + x/v) b) f(t + v/x) c) f(t-x/v) d)-f(t-x/v)
   ii) The unit of modulus of elasticity
   a) Newton b) Pascal c) Joule d) Newton/meter
   iii) Which of the following is an example of anharmonic oscillator?
   a) Compound pendulum b) LC circuit c) diatomic molecule d) Clock pendulum
   iv) The ratio of radii of gyration of a thin circular disc and a ring of the same mass about tangential axes are in the ratio
   a) 6:7 b) 6:5 c) 5:6 d) 1:1

Section B

(Answer any SIX questions .Each question carries a weightage of 1)

3. What is the importance of Poisson's Ratio?
4. Write down the three dimensional differential equation for wave motion
5. Explain Q-factor.
6. State parallel axes theorem.
7. Distinguish between non-uniform and uniform bending.
8. Draw the PE curve for a harmonic oscillator
9. Write down time dependent Schrödinger equations and explain the symbols.
10. Write down any one difference between progressive and Stationary waves

Section C

(Answer any NINE questions. Each question carries a weightage of 2)

11. Show that volume strain is equivalent to three mutually perpendicular linear strains each being equal in magnitude to (1/3)rd of linear strain.
12. Derive an equation for the bending moment of a beam.
13. Obtain an equation for the energy density of a plane progressive wave

14. The equation for a plane progressive wave is given by $y=0.04 \sin 2\pi (t/6-x/10)$ meters. What are the amplitude ,period ,frequency and velocity of the wave
15. Calculate the speed of transverse waves in a wire of cross sectional area 1 mm^2 subjected to a tension of 0.1 Kg wt. The density of the wire is 10.5×10^3 Kg/m^3
16. Derive an equation for the period of a compound pendulum in terms of length of an equivalent pendulum
17. A particle of mass 1gm executing SHM with amplitude 10cm. and period 1 second has PE equal to $10\pi^2 \times 10^{-6}$ J at a distance 's' from the mean position .Calculate its KE at this position
18. The Q-factor of an oscillating LCR circuit is100 and its frequency is 8 kHz. How will its frequency change when its resistance is reduced to zero
19. A thin and uniform metal rod of mass m and length 2ℓ is sharply bent at its mid-point so that its 2 halves are inclined by an angle. Calculate its MI about an axis passing through its mid-point and perpendicular to its plane
20. A uniform solid sphere of mass 1.5 kg and radius0.2metres makes 5 revolutions per second about a diameter. How much torque is required to increase its angular momentum about the axis by 20% in 25seconds
21. State and explain uncertainty principle Give an example to verify uncertainty principle
22. Find the deBroglie wavelength of a bullet of mass 1g moving with a kinetic Energy 1000 J

Section D

(Answer any ONE question .Each question carries a weightage of 4)

23. Derive an expression for the moment of inertia of a hollow sphere about its diameter and a chord. Compare the results with those of a solid sphere of the same mass
24. Explain Davisson-Germer experiment. Discuss its results

Sd/-
M.Vijayan,
Chairman,BOS Physics(UG).

K A N N U R U N I V E R S I T Y
(Abstract)

B.Sc Physics Programme– Model Question Papers for II Semester (Core and Complementary Courses) –Examinations under CCSS- with effect from 2009 Admission– Implemented – Orders issued.

ACADEMIC BRANCH

U.O.No.Acad/C2/302/2007. Dated, K.U.Campus.P.O, 09-03-2010.

Read: 1. U.O No.Acad/C2/302/2007 dated 10-07-2009.
2. U.O No.Acad/C2/302/2007 dated 13-10-2009.
3. Letter dated 20-02-2010 from the Chairman, Board of Studies in Physics (UG).

O R D E R

1. The Scheme and Syllabus of B.Sc Physics Programme (Core and Complementary Courses) and the Model Question Papers for I Semester examinations under Choice based Credit Semester System were implemented in this University with effect from 2009 admission as per paper read (1) & (2) above.

2. As the paper read (3) above, the Chairman, Board of Studies in Physics (UG) has forwarded the Model Question Papers for II Semester B.Sc Physics (Core & Complementary Courses) examinations, for implementation with effect from 2009 admission under Choice based Credit Semester System.

3. The Vice-Chancellor, after considering the matter in detail, and in exercise of the powers of the Academic Council, as per Section 11 (1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction ***to implement the Model Question Papers for II Semester B.Sc.Physics (Core & Complementary Courses) Examinations under CCSS with effect from 2009 admission***, submitted by the Chairman Board of Studies in Physics (UG), subject to report to the Academic Council.

4. The Model Question Papers are appended.

5. Orders are therefore issued accordingly.

Sd/-
REGISTRAR

To:

1.The Principals of Colleges offering Physics Programme.
2.The Examination Branch (through PA to CE).

Copy to:

Forwarded/By Order

1. The Chairman, Board of Studies in Physics (UG).
2. PS to VC/PA to PVC/PA to Registrar.
3. DR/AR-I (Academic). SECTION OFFICER
4. SF/DF/FC

Model Question Paper

Reg.No: ……
Name …….

2C02PHY ELECTRICITY, MAGNETISM&THERMAL PHYSICS

Time 3 hours *Total Weight 30*

Section-A

(Choose the correct answer; each bunch carries a weightage of 1)

1. i) To convert a galvanometer into an ammeter…

   a) connect a high resistance in parallel b) connect a low resistance in series

   c) connect a shunt resistance in parallel d) connect a high resistance parallel

   ii) Time constant of an LR circuit is…

   a) L/R b) R/L c) 1/(LR) d)LR

   iii) Aluminum is an example of …. Material

   a)Paramagnetic b)Ferromagnetic c)Diamagnetic d)Ferromagnetic

   iv) Zeroeth law of thermodynamics defines…

   a) Internal energy ii) temperature c) Entropy d)none above

2. i) Mean value of alternating current over a cycle is …

   a) $i_o/2$ b)0 c)$i_o/\sqrt{2}$ d)infinity

   ii) Dimensions of inductance are …

   a) L b) $ML^2T^{-2}I^{-2}$ c) $ML^{-2}T^2I^{-2}$ d) $ML^2T^2I^2$

   iii) Internal energy of an ideal gas is a function of…

   a) Temperature b} Volume c) Pressure d) Bulk modulus

   iv) Equilibrium state is a state of maximum …

   a) Enthalpy b) Temperature c) Entropy d) None above

Section-B

(Answer any SIX questions .Each question carries a weightage of 1)

3. What is the principle of Carey Foster Bridge?
4. What is damping correction?
5. What is an acceptor circuit?
6. Draw the graph showing growth of current in a circuit containing a resistance and capacitance
7. Derive an equation for an isothermal process
8. Define the C.O.P of a refrigerator
9. Draw T-S diagram for adiabatic process
10. State 3rd law of thermodynamics

Section C

(Answer any NINE questions. Each question carries a weightage of 2)

11. A 2V battery of internal resistance 1ohm is connected in series with resistance 10 ohms and 10m potentiometer wire .Find the resistance of the potentiometer wire if the potential drop per cm. is 1mV
12. A capacitor of capacitance 1μF is discharged through a high resistance. In 10 seconds the charge on the capacitor is reduced to ¼ th of initial value. Calculate the resistance
13. Derive an equation for the resonant frequency of an ac circuit containing an inductance resistance and capacitor connected in parallel
14. Find the r.m.s. value: A $\cos^2(\omega t + \varphi)$ for a full cycle and for a half cycle
15. A rod of magnetic material (χ_m=0.0060) of length 0.5m has a coil of 100 turns wound over it uniformly. If current of 2A is sent through it, calculate the magnetizing field and the magnetic flux density **B.**
16. Show that **B** =μo(**H**+**M**) and μ =μo(1 + χ_m)
17. An ideal gas is compressed adiabatically to 4 times its original pressure and then expanded isothermally to the original volume. Find the resulting pressure and temperature
18. State and explain first law of thermodynamics .Give an application
19. A Carnot engine is operating between 0^{o}C and 100^{o}C .Find the efficiency and power of the engine if Q_1 =1000W
20. State and prove Carnot's theorem
21. From the T-S diagram ,derive the efficiency of a Carnot Engine
22. A Carnot engine working as a refrigerator is powered by a 1 KW motor, rejects 1750 kW heat to the atmosphere at 27^{o}C. Find the temperature of the interior of the refrigerator

Section D

(Answer any ONE question. Each question carries a weightage of 4)

23. Explain the principle of rotating magnetic field and the construction and working of Induction Motor.

Explain how the concept of entropy is introduced from a set of adiabatics and isothermals. Derive an equation for Entropy of an ideal gas in terms of i) P and V ii)P and T

Sd/-
M.Vijayan,
Chairman,BOS Physics(UG).

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

(Abstract)

B.Sc Physics Programme– Revised scheme & Syllabus for Open Courses and Model Question Papers(Core/Complementary/Open Courses)– Implemented with effect from 2009 Admission – Orders issued.

ACADEMIC BRANCH

U.O.No.Acad/C2/302/2007. Dated, K.U.Campus.P.O, 17 -07-2010.

Read: 1. U.O No.Acad/C2/302/2007 dated 10-07-2009.
2. U.O No.Acad/C2/302/2007 dated 13-10-2009.
3. U.O No.Acad/C2/302/2007 dated 09-03-2010.
4. Minutes of the meeting of the Board of Studies in Physics (UG) held on 24-11-2009.
5. Letter dated 16-06-2010 & 29-06-2010 from the Chairman, Board of Studies in Physics (UG).

O R D E R

1) The Scheme and Syllabus of B.Sc Physics Programme (Core and Complementary Courses) and the Model Question Papers for I &II Semester examinations under Choice based Credit Semester System were implemented in this University with effect from 2009 admission as per paper read (1),(2) &(3) above.

2) The Board of Studies in Physics (UG) in the meeting held on 24-11-2009 vide paper read (4) above, recommended to revise the scheme of Open Courses by replacing 6D02PHY-B.Computer Applications with 6D02 PHY-B.Biophysics and the recommendation of the Board of Studies is endorsed by the Faculty of Science.

3) As per the paper read (5) above, the Chairman, Board of Studies in Physics (UG) has forwarded the revised scheme & syllabus of Open Courses along with Model Question Papers of B.Sc Physics Programme (Core/Complementary/Open Courses), for implementation with effect from 2009 admission under Choice based Credit Semester System.

4) The Vice-Chancellor, after considering the matter in detail, and in exercise of the powers of the Academic Council, as per Section 11 (1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction ***to implement the revised scheme & syllabus of the Open Courses along with the following Model Question Papers of B.Sc.Physics Programme (Core/Complementary/Open Courses) under CCSS with effect from 2009 admission***, submitted by the Chairman Board of Studies in Physics (UG), subject to report to the Academic Council.

i)3B03PHY-Classical Mechanics
ii)3C03PHY -Optics
iii)4B04PHY -Optics
iv)5B09PHY- Basic Electronics
v)5B10PHY- Atomic,Nuclear and Particle Physics
vi)6B12PHY- Photonics
vii)6B14PHY- Digital Electronics
viii)6B15PHY- Elective:B Astronomy & Astrophysics
ix)5D01PHY-A.Environmental Physics
x)5D01PHY-B.Applied Electronics
xi)6D02PHY-A.Non Conventional Energy Sources.

5) The revised scheme & syllabus of Open Courses and Model Question Papers as detailed above are appended.

6) Orders are therefore issued accordingly.

Sd/-
REGISTRAR

To:

The Principals of Colleges offering B.Sc Physics Programme.

Copy to:

1. The Examination Branch (through PA to CE).
2. The Chairman, Board of Studies in Physics (UG).
3. PS to VC/PA to PVC/PA to Registrar.
4. DR/AR-I (Academic).
5. SF/DF/FC

Forwarded/By Order

SECTION OFFICER