PERIYAR UNIVERSITY, SALEM.11
REGULATIONS

1.Eligibility

Candidates seeking admission to first year of the Bachelor of Science – Physics shall be required to have passed the Higher secondary examination with Mathematics, Physics and Chemistry conducted by the Government of Tamilnadu or an examination accepted as equivalent thereto by the Syndicate subject to the conditions as may be prescribed thereto are permitted to appear and qualify for B.Sc., `(Physics) degree examination of this University after a course of study of three academic years.

2. Duration of the Course:

The course for the degree of Bachelor of Science shall consist of three academic years .

3. Course of Study

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

I YEAR

1. Language – I (Tamil etc)
2. English – I
3. Major I
4. Major II
5. Allied Maths
6. Major Practical I

II YEAR

5. Language – II
6. English II
7. Major – III
8. Major IV
8. Major Practical II
9. Allied Chemistry
10. Allied Chemistry Practicals

III YEAR

11. Major V
11. Major VI
12. Major – VII
13. Major –VIII
14. Elective
15. Major Practical III
16. Major Practical IV

4. Examinations:

The theory examination shall be three house duration to each paper at the end of each year The candidates failing in any subject (s) will be permitted to appear for each failed subject(s) in the subsequent examination.

The practical examination for UG course should be conducted at the end of year.

5. Scheme of Examinations:

The Scheme of Examination of different semester shall be as follows:

S.No	Paper	Title of Paper	Duration	Marks
I Year				
1.	Language	Language-I	3	100
2.	English	English-II	3	100
3.	Major I	Mechanics and Sound	3	100
4.	Major II	Heat and Properties of matter	3	100
5	Major	Major Practical I	3	100
6	Allied	Allied Mathematics	3	150
II year				
7.	Language	Language-II	3	100
8.	English	English-II	3	100
9.	Major III	Optics and Spectroscopy	3	100
10.	Major IV	Mathematical Physics	3	100
11	Major	Major Practical-II	3	100
12.	Allied	Allied Chemistry	3	100
13	Allied	Allied Chemistry Practical	3	50
III year				
14.	Major V	Electricity and Magnetism	3	100
15.	Major VI	Atomic and Nuclear Physics	3	100
16	Major VII	Quantum mechanics and relativity	3	100
17	Major VIII	Electronics	3	100
18.	Electives (Any one of the following Papers)			
18A.	Major	Electronics and Communication	3	100
18B	Major	Computational Physics	3	100
18C	Major	Computer Programming in C	3	100
18D	Major	Energy Physics	3	100
19	Major	Major Practical-III	3	100
20	Major	Major Practical-IV	3	100
			Total Marks	2000

6. Question Paper Pattern:

Time: 3 Hours ***Max Marks-100***

Part A: 10 x 2 = 20
(Answer all questions)
(Two questions from each unit)

Part B: 5 x 4 = 20
(Answer all questions)
(One question from each unit with internal choice)

Part C: 5 x 12 = 60
(Answer all questions)
(One question from each unit with internal choice)
(In Part B out of total 10 question 4 questions may be problem oriented)

7. Passing Minimum:

The candidate shall be declared to have passed the examination if the candidate secures not less than 40 marks in the University examination in each theory paper. For the practical paper a minimum of 40 marks out of 100

marks in the University examination and the record notebook taken together is required to Pass the examination. There is no passing minimum for record notebook. However submission of record notebook is a must.

8. Classification of Successful candidates:

Candidates who secure not less than 60% of the aggregate marks in the whole examination in First Class.

All other successful candidates shall be declared to have passed in Second Class.

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed in First Class with Distinction provide they pass all the examinations prescribed for the course at first appearance.

Candidates who pass all the examinations pres cribbed for the course in the first attempt and within a period of three academic years from the year of admission to the course alone are eligible for University Ranking.

9. Maximum duration for the completion of UG Program:

The maximum duration for the completion of UG Program shall not exceed six years

10. Commencement of this Regulation:

These regulations shall take effect from the academic year 2007-08 and thereafter.

11.Pattern of Question Paper for Practical Examinations;

Each set of question paper should contain SEVEN questions and the candidate has to choose one by lot.

12. Awarding of marks for Practical examinations.

Total Marks: 100 (Practical 80 Marks + Record 20 Marks)
Distribution for 80 Marks:

Formula, circuit diagram and tabular column:	16 Marks (20%)
Observation:	32 Marks (40%)
Result:	8 Marks (10%)
Presentation:	8 Marks (10%)
Total	80 Marks

S Y L L A B U S

Paper-I MECHANICS AND SOUND

UNIT:I

PROJECTILE: Range up and down and inclined plane-maximum range-two directions of projection for a given velocity and range.

IMPULSE-IMPACT: Laws or impact – coefficient of restitution –impact of a smooth sphere on a fixed smooth plane-Direct impact between two smooth spheres-Losses in kinetic energy in direct impact-Oblique impact between two smooth spheres.

UNIT:II

SHM: Composition of two SHM's of same period along a straight line and at right angles to each other-Lissajous figures.

DYNAMICS OF RIGID BODIES: Compound pendulum-theory-condition for minimum period-interchangeability of center of suspension and center of oscillation-g using compound pendulum-Bifilar pendulum-parallel and non-parallel threads.

UNIT:III

CENTER OF GRVITY: Center of gravity of a solid cone, Solid hemisphere, hollow hemisphere and a tetrahedron.

FRICTION: Laws of friction-angle of friction-resultant reaction and cone of friction-equilibrium of a body on an inclined plane under the action of a force.

CENTER OF PRESSURE: Definition-center of pressure of a rectangular lamina and triangular lamina.

ATMOSPHEREIC PRESSURE: Variation of atmospheric pressure with attitude-height of homogenous atmosphere.

UNIT:IV

CLASSICAL MECHANICS: Mechanics of system of particles-conservation theorem for angular momentum and energy- constraints-classification- generalized coordinates-transformation equations-principle of virtual work-D'Alembert's principle-derivation of Lagrangian formulation of conservation theorems - generalized momentum-energy and linear momentum.

UNIT:V

SOUND: Theory of damped and forced vibrations-sharpness of resonance-Fourier theorem -application for saw tooth wave and square wave.

ULTRASONICS: Production-piezoelectric crystal method-magnetostriction method-detection properties-applications.

ACOUSTICS OF BUILDINGS: Reverberation-derivation of Sabine's formula- determination of absorption coefficient.

BOOKS FOR STUDY:

1.Mechanics and Mathematical Methods(2005)
by R.Murugesan. S.Chand and Co.
2.Dynamics by M.Narayanamurti and M Nagarathnam. (2005)
The National Publishing Company.
3.Statics, Hydrostatics and Hydrodynamics. (2005)
By M.Narayanamurti and M.Nagarathnam.

The National Publishing Company
4. Properties of matter and Acoustics. (2005)
By R.Murugesan. S.Chand and Co.

BOOKS FOR REFERENCE:

1.Sound by Khanna and Bedi. (2005)
Atmaram and Sons.
2.A Text Book of Sound(2005)
By M.Ghosh.S.Chand & Co
3.A Text Book of Sound(2005)
By R.L.Saighal.S.Chand & Co
4.A Text Book of Sound(2005)
By N. Subrahmanyam and Brijlal S.Chand and Co.,
5.Classical Mechanics by H.Goldstein(2005)
Addison Wesley Publications
6.Mechanics (2005)by D.S.Mathur.S.Chand and Co.,

PAPER II - THERMAL PHYSICS AND PROPERTIES OF MATTER

UNIT-I

Joule- Thomson effect- porous plug experiment- Theory- Adiabatic demagnetisation Liquefaction of air, nitrogen, Helium gases- Practical applications of low temperature- Refrigerators- Air conditioning machines- effect of chloro fluoro carbon on ozone layer.

Unit II

Zeroth, first, second and third laws of thermodynamics- Heat engines- Carnot,Otto and Diesel engines- Working and efficiency-entropy- Change in entropy in reversible and irreversible process- temperature –entrpy diagram- Maxwell's thermodynamic relations-applications- Tds equations- Clausius – Clayperon latent heat equations

Unit- III

Thermal conductivity- Forbes method- Lee's disc method- Black body radiation- Wien's law- Rayleigh Jeans law- Planck's law-Stefan's law- Determination of Stefan's constant- Pyrometers- Pyrheliometers- Solar costant- determination of temperature of sun.

Unit-IV

Bending of beams- expression for bending moment-depression of the loaded end of cantilever – uniform and nonuniform bending- theory and experiment-Koenigs method- theory and experiment- I form of girders- Torsion- expression for couple per unit twist- Torsion pendulum theory and experiment- Static torsion method of determining rigidity modulus.

Unit V

Coefficient of viscosity- Oswald,s viscometer-Searle's viscometer-Theory and experiment- Viscosity of gases- Meyer's formula-Rankine's method

Surface tension- excess pressure inside a curved surface-surface tension and interfacial surface tensin- method of drops- Quincke's method- surface tension and angle of contact of mercury-variation of surface tension with temperature.

Books for study and reference.

1. Heat and Thrmodynamics Brijlal and Subramaniam S.Chand & Co New Delhi (2007)

2.Heat and Thrmodynamics D. S. Mathur S Chand & Co New Delhi 2005

3. Heat and Thermodynamics J.B Rajam & C.L. Arora S Chand & Co New Delhi 2004

4.Properties of Matter R Murugesan S Chand & Co New Delhi 2007

5.Proprties of matter Brijlal & Subramani S Chand & Co New Delhi (2005)

6.Elements of Properties of matter D. S Mathur S Chand & Co New Delhi (2006)

PHYSICS MAIN PRACTICALS –I

1. Young's modulus – Non uniform Bending – pin & microscope method
2. Young's modulus – uniform bending – scale and telescope method
3. Torsion pendulum - dynamic method –Rigidity Modulus
4. Surface tension and interfacial surface tension – Drop Weight method
5. Sonometer - frequency of a fork
6. Sonometer – R.D of a solid and liquid
7. Specific heat capacity of a liquid – Method of a mixtures – Barton's correction
8. Spectrometer i – d curve
9. Spectrometer – Grating – Standardization – normal incidence measurement of Wavelength
10. Potentiometer – calibration of low range Voltmeter
11. Potentiometer – Internal resistance of a cell
12. Field along the axis of a coil – deflection magnetometer
13. P O Box – Temperature coefficient of resistance
14. Joule's calorimeter – Specific heat capacity of a liquid – Barton's correction
15. B. G current and voltage sensitive
16. B. G charge sensitivity
17. Bridge rectifier
18. Zener diode – Voltage regulator
19. Low range power pack
20. NAND , NOR gates as Universal Building Block

PAPER III - OPTICS AND SPECTROSCOPY

UNIT-I

Newton's rings in reflected light-determination of wavelength and refractive index-Michelson interferometer-construction and working-types and visibility of fringes-determination of wavelength, resolution of spectral lines, refractive index and thickness of a thin sheet.

Unit II

Fresnels assumptions- rectilinear propagation of light-zone plate- action for plane and spherical wave fronts-comparison of zone plate and convex lens- Fresnel and Fraunhofer diffraction-Plane diffraction grating-normal and oblique incidence-determination of wavelength using grating-dispersive power of grating- resolving power of telescope, microscope, prism and grating.

Unit III

Double refraction- Nicol prism- Optical activity- Fresnel's explanation- specific rotatory power by Laurent's half shade polarimeter
Optical fibres-propagation of light- acceptance angle- numerical aperture- mode propagation-step and grade index fibres-absorption, scattering and bending losses- core and cladding losses-fibre communication advantages- light sources.

UNIT-IV

Rotation spectra of molecules-Theory- instrumentation- applications-Infrared spectroscopy- energy of diatomic molecule- vibration rotation spectrum- IR spectrometer-Raman effect- Classical and quantum theory-Pure rotational and vibrational Raman spectra-Techniques and instrumentation- Applications.

Unit V

Basic theory of NMR, ESR and NQR- Techniques and instrumentation – applications

Books for study and reference

1. A text book of Optics Brijlal and Subramani S Chand & Co (2007)

2. Optics R Murugesan S Chand & Co (2006)

3.Optic fibres and Fibre Optic Communication systems Subir Kumar Sarkar SChand & Co (2003)

4. Fundamentals of molecular Spectroscopy Banwell & McGagh TMH
5. Vibrational spectroscopy D N Sathyanarayana New Age International (2004)

Paper IV: Mathematical Physics

UNIT-IVector space and Tensors

Vector Space-Definitions-Linear independence of Vector-Bilinear and quadratic forms-change of basis-Schmidt's orthogonalisation processes-Swartz inequality-Application of vectors to hydrodynamics the equation of flow in solids.

Tensors- definitions- N-dimensional space–superscripts-subscripts-coordinate-transformations kronecker delta symbol-properties of kronecker generalized kronecker delta Tensors of higher ranks-Algebric operation of Tensors-symmetric and asymmetric Tensors-Application of Tensors-Dynamics of a particle-Elasticity-Rigid bodies

UNIT-II Laplace and Fourier Transforms

Laplace transforms – definitions and properties- methods of finding Laplace transforms-inverse transform and its properties- methods of finding inverse Laplace transform – applications of Laplace transforms- solution to differential equations. Fourier transform – properties of Fourier's transform-Fourier transform of a derivative- Fourier's Sine and cosine transform of a derivative-Finite Fourier transforms-Simple application of Fourier transforms.

Unit III Matrices

Solutions to linear equations- Cramer's rule- Characteristic matrix and characteristic equations of a matrix – eigen values and eigen vectors – sub space and null spaces-transformations-Hermitian form- diagonalisation of 3 by 3 symmetric matrices.

Unit IV Special Functions

Beeta functions - definitions – properties, Gamma functions- definitions- properties- relation between beeta and gamma functions- reduction of definite integrals using these functions – Applications

Bessel-Legendre-Lagure and Hermite differential equation-properties-Generating functions-Rodrigue's formula-orthogonal properties-recurrence relations

Unit V Numerical Methods

Cure fitting- principle of least squares- fitting a straight line – linear regression- fitting a parabola- fitting an exponential curve. Solving non liner equations- bisection method-successive approximation method- Euler's method- Newton Rapson method- R.K method.

Books For Study

1. P.K.Chattopadhyay Mathematical Physics,Wiley Eastern Ltd,N.Delhi(1990)
2. B.D.Gupta,Mathematical Physics Vikar Publishing House Pvt.Ltd.(1995)
3. Sathyaprakash,Mathematical Physics,Sultan Chand & Sons,New Delhi(2004)
4. M.K.Venkataraman, Numerical methods in Science and Engineering- PHI , New Delhi – 1997
5. S.S. Sastry , Introductory methods of numerical analysis- PHI, New delhi- 2000

MAIN PRACTICAL –II

1. Young's modulus – non uniform bending – pin and microscope
2. Young's modulus – uniform bending – scale and telescope method
3. Torsion pendulum- MI and rigidity modulus – symmetrical masses
4. Coefficient of viscosity of a liquid – graduated burette – radius by mercury pellet method.
5. Melde's apparatus – frequency – transverse and longitudinal modes.
6. Specific heat capacity of a liquid by cooling – verification of Newton's law of cooling .
7. Melde's apparatus – RD of a solid and liquid .
8. Air wedge thickness of a wire and its insulation.
9. Spectrometer – dispersive power of a prism.
10. Spectrometer – grating – minimum deviation.
11. Potentiometer – ammeter calibration..
12. Potentiometer – specific resistance.
13. M and BH – Deflection Magnetometer – TAN A and TAN B positions
14. Cary Foster's bridge – specific resistance.
15. BG Comparison of capacities.
16. BG comparison if EMF's of two cells.
17. Half and Full adder.
18. Half and Full subtractor.
19. Verification of DeMorgan's theorems .
20. OPAMP- Integrator and differentiator.

PAPER V - ELECTRICITY AND MAGNETISM

Unit I

Carey Foster's bridge-theory- determination of temperature coefficient – Thermoelectricity- determination of Pelltier coefficient- thermodynamics of thermocouple-expression for Peltier and Thomson coefficients-uses of thermoelectric diagrams-Gibbs- Helmholtz equation for the emf of a reversible cell- calculation of emf of Daniel cell- emf of thermocouple using potentiometer- calibration of high range voltmeter.

Unit-II

Magnetic induction on the axis of a solenoid-Moving coil ballistic galvanometer-theory-damping correction-charge sensitivity of a BG-determination of absolute capacity of a condenser-thermo emf of a thermocouple using BG-absolute mutual inductance between pair of coils using BG- coefficient of coupling between pair of coils- induction coil and its uses.

Unit- III

Growth and decay of currents in LR circuits-growth and decay of charge in CR circuits-determination of high resistance by leakage- growth and decay of charge in LCR circuit-condition for growth and decay to be ocillatory-expression for frequency of oscillation-series and parallel resonant circuits-theory- comparision-Power in LCR circuit-skin effect-Tesla coil.

Unit IV

Different types of magnetic materials-classical theory of diamagnetism-Langevin theory of paramagnetism- Weiss theory of paramagnetism-molecular field theory of ferromagnetism-quantum theory of ferromagmetism-domain theory of ferromagnetism- applications of soft magnetic materials and ferrites.

Unit- V

Fundamental definitions in dielectrics-types of electric polarization-frequency and temperature effects on polarization- Classius – Mosotti relation-determination of dielectric constant-dielectric breakdown-properties and different types of insulating materials.

Books for study:

1. Electricity and Magnetism R Murugesan S . Chand & Co
2.Electricity and Magnetism- Narayanamurthy and Nagarrthnam
National Publishing Company
3.Material Science Dr M Arumugam Anuradha Agencies

Books for reference

1.Electricity and Magnetism D N Vasudeva S Chand & Co
2.Electricity and Magnetism K K Tiwari S Chand & Co
3.Introduction to Solid State Physics C Kittel John Wiley
4.Solid state Physics Deckker

PAPER VI - ATOMIC AND NUCLEAR PHYSICS

Unit- I

Vector atom model-quantum numbers-coupling schemes-j-j coupling and L-S coupling- application of spatial quantization-Pauli's exclusion principle-selection rule-intensity rule-interval rule- Lande's g factor-Bohr magneton-applications of vector atom model-periodic classification – electronic configurations- magnetic dipole moment due to spin- Stern- Gerlach experiment.

Unit- II

Spectral terms and notations-fine structure of sodium D lines-fine structure of Hα line- effect of electron spin on fine structure of spectral lines- fine structure of alkali spectra and ionized He- Zeeman effect-Larmor's theorem- quantum mechanical explanation of normal Zeeman effect- anomalous Zeeman effect of D1, D2 lines of sodium- Paschen Bach effect- Stark effect.

Unit III

Nuclear detectors- solid state detector- proportional counter-cloud chamber-Bubble chamber- scintillation counter-Accelerators-cyclotron-synchrocyclotron-betatron.

Artificial transmutation- Rutherford's experiment-theory of nuclear disintegration- Q value –threshold energy- types of nuclear reaction- energy balance and Q value-threshold energy of endo energic reaction- scattering crosssection.

Unit IV

Nuclear structure- nuclear size-experimental measurement of nuclear radius-neutron interaction method- isotope structure method-mirror nuclei method-nuclear charge- measurement by the method of alpha scattering-Meson theory of nuclear forces-nuclear models- liquid drop model- Weiszacker's semi empirical mass formula- shell model.

Unit V

Nuclear fission- types of nuclear fission-Bohr Wheeler theory-chain reaction-critical size-critical mass-nuclear fusion- source of stellar energy- Carbon – nitrogen cycle- proton- proton cycle-thermonuclear reaction- controlled thermo nuclear reaction .

Elementary particles-types of interactions-classification of elementary particles-elementary pareticle quantum number- Baryon number-leppton number-strangeness number-hypercharge-isospin and isospin quantum numbers-conservation laws and symmetry-parity, charge conjucation symmetry- time reversal symmetry-combined inversion of CPT.

Books for study;

1.Modern Physics R Murugesan S Chand & Co
2.Atomic Physics J B Rajam S Chand & Co
3. Nuclear Physics D C Tayal Himalaya Publishing Co

Books for reference:

1.A Source book of atomic energy Samuel Glasstone East West Press
2.Atomic and Nuclear Physics Albright Semat Chapman and Hall
3.Basic Nuclear Physics and Cosmic rays B N Srivatsava Pragati Prakashan

PAPER VII -QUANTUM MECHANICS

UNIT – I

Breakdown of classical mechanics – inadequacy of old quantum theory – Matter waves – wave packet – G.P. Thomson's verification – Heisenberg's uncertainty principle – illustrations - Wave function – physical significance – well-behaved wave functions – Operators – Postulates of quantum mechanics - normalization – expectation value and Ehrenfest's theorem – Schrodinger's time dependent and time independent wave equation – derivation.

UNIT – II

One dimensional problems – particle in a box – eigen functions and eigen values – linear harmonic oscillator – rectangular potential barrier – one dimensional potential well and infinitely deep potential well – note on tunneling and alpha decay.

UNIT – III

Three dimensional problems – separation of variables – rigid rotator – rotational energy levels and eigen functions – hydrogen atom – separation of variables – azimuthal, polar and radial equations – energy levels and eigen functions – quantum numbers.

UNIT – IV

Statistical equilibrium – phase space – microstates and macrostates – Maxwell – Boltzmann distribution law – application to ideal gas – Quantum statistics – Fermi – Dirac distribution law – application to electron gas – Bose-Einstein distribution law – application to photon – comparison of the three statistics.

Unit V: Special theory of Relativity

Postulates – Lorenz transformations – Time dilation – Length contraction – Doppler effect – Twin paradox – velocity addition – relativistic momentum – Mass energy equivalence – Electricity and Magnetism in relativity – Introduction to general relativity.

TEXT BOOK:

1. R. Murugeshan, Modern Physics, S.Chand & Co., New Delhi, 2005
2. Brijlal and Subramaniam, Heat and thermodynamics, S.Chand & Co., New Delhi, 2005.

Reference Book:

1. J.B.Rajam, Modern Physics, S.Chand & Co., New Delhi,

PAPER VIII - ELECTRONICS

Unit I

Semiconductor Special Devices

JFET – Construction, characteristics - common source amplifier-Design guide lines – MOSFETS – depletion and enhancement mode MOSFETS – MOSFETS as switches –UJT - relaxation oscillator – SCR – Tunnel diode, Gunn diode, PIN diode – IMPATT diode – DIAC and TRIAC – construction and characteristics.

UNIT – II

Wave form generators and Active filters

Sine wave oscillation with phase shift and wein's networks-Comparator-Schmitt Trigger-Astable and Monostable operations-Triangular wave generator.

Active filters-Butterworth filters design-Second order law-Low,High and Band pass filters-Band notch filter.

UNIT – III

Operational amplifier and analog computation

Operational amplifiers –characteristics and parameters– Mathematical operations – logarithmic – antilog amplifiers – Analog multiplier and divider – solutions to simultaneous equations –differential equations, harmonic oscillator, damped harmonic oscillator, rocket launching.

Unit –IV

Digital Electronics

Number systems- binary, octal hexa- logic gates- Universality of NAND and NOR gates- binary adder and subtractors – Half adder – full adder – half subtarctor- Full subtractor- Boolean algebra – simplification of Boolean expressions- K.Maps (Simple systems only)-

Unit – V

Registers and Counters

Flip-flops- RS – Clocked RS- D- T- JK – JK M/S flip flops- binary counters- decade counters- Up/Dn counters - Shift registers- Digital to analog Converters - Binary weighted – Resistor, DAC – R/2R ladder DAC – Successive approximation method –Single slope and Dual slope ADC-– counter type-Resolution, Accuracy and Linearity.

Books For Study

1. Electronic devices and Circuits – G.K. Mithal Khanna Publishers – New Delhi.

2. Integrated Circuits – K.R. Bothkar.

4. Integrated Electronics – Analog & Digital Circuits and Systems – Tata Mc Graw Hill – Jacob Millman & Christor. S.C. Halkias.
5. Operational amplifier – Gayakwad – TMG Hill

MAJOR PRACTICAL III

1. Cantilever- Young's modulus – mirror and Telescope
2. Static torsion – Rigidity modulus
3. Compound pendulum
4. Coefficient of viscosity – ungraduated burette – radius by mercury pellet
5. Kundt's tube – Young's modulus – velocity of sound
6. Lee's disc – thermal conductivity of a bad conductor and emissivity
7. Newton's rings – refractive index of a lens
8. Spectrometer – I-I′ curve
9. Spectrometer – small angled prism
10. Potentiometer – calibration of high range voltmeter
11. Deflection magnetometer – m and B_H – TAN C position
12. Copper Voltameter - B_H
13. Principle of multimeter
14. BG – Determination of absolute capacity
15. Determination of Thermo emf- direct method – BG
16. FET characteristics
17. UJT characteristics
18. SCR characteristics
19. Hartley oscillator
20. Colpitt oscillator

MAJOR PRACTICAL – IV

1. Koenig's method – non uniform bending
2. Koenig's method – uniform bending
3. Cantilever – dynamic method
4. Bifilar pendulum – parallel threads
5. Viscosity of highly viscous liquid – Searle's viscometer
6. Thermal conductivity of good conductor – Forbes method
7. Newton's rings – Refractive index of a liquid
8. Spectrometer – dispersive power of a grating
9. Spectrometer – Cauchy's constant
10. Potentiometer- emf of a thermocouple
11. Field along the axis of a coil – Vibration magnetometer
12. Carey Foster's bridge – temperature of coefficient of resistance
13. BG comparison of Capacities – De Sauty's bridge
14. BG comparison of mutual inductances
15. BG absolute determination of mutual inductance
16. Astable multivibrator using 555 timer
17. Monostable multivibrator using 555 timer
18. Bistable multivibrator using 555 timer
19. Flip flops using gates
20. RC coupled amplifier – single stage

ELECTIVE-I:ELECTRONICS AND COMMUNICATION

UNIT – I

Modulation – definition – types of modulation AM, Fm, Pm – expression for amplitude modulated voltage – Wave form of amplitude modulated – wave – collector modulation circuit – single side band generation – balanced modulator – Am transmitter – block diagram and explanation – frequency modulation – expression for frequency modulated voltage – side bands in FM, FM production by transistor reactance modulator – expression for phase modulation – Comparison of AM, FM, PM

UNIT – II

Demodulation – definition – Diode detection of AM signals – FM detection – Foster Seely discriminator

Radio receivers – straight receivers – TRF receivers – super heterodyne receivers – Block diagram – explanation of each stage – FM receivers – Block diagram – AGC

UNIT – III

TV- plumbicon – vidicon – scanning – simple and interlaced scanning – composite video signal – horizontal, vertical and synchronizing pulses – block diagram of TV transmitter and receiver – Color TV – generation R, G, B signals – Simplified block diagram of color TV transmitter and receiver – TV transmitting antennas – turnstile array- dipole panel – TV receiving antenna – Yagi antenna – log periodic antenna

UNIT – IV

RADAR – principle of radar- azimuth and range measurement – radar-transmitting systems – radar antennas – duplexer – radar receivers – uses of radar Opto electronic devices – photoconductive cell – solar cell – phototransistor – LED-LCD construction and working

UNIT-V

Digital communications – digital technology – fundamentals of data communication systems – characteristics of data transmission circuits – digital codes – error detection and correction – data sets and inter connection requirements – modem classification – modem interfacing

Books for study:

1. Hand book of electronics – Gupta & Kumar Pragati Prakashan(2005)
2. Electronics communication systems – Kennedy and Davis, TMH

ELECTIVE-II:PROGRAMMING IN LANGUAGE C

UNIT-I

Introduction –Basic structure of C –Programs-Character set-Key words and identifiers-constants Variables –Data types –declaration of variables-assigning values to variables-defining symbolic constants, Operators and Expressions

UNIT-II

Reading & Writing a character –formatted input & output –if-if…else…else if ladder-switch statement.-? Operator – go to statement, -while-do-for statements.

UNIT-III

Array –Introducing-one dimensional& two dimensional arrays-initializing two dimensional arrays.

Handing of character strings

UNIT-IV

User defined functions –form of C functions-Return values &their types-Calling a function -Three categories of functions

Structures and unions-introduction-structure definition-giving values to members – structure initialisation – unions.

UNIT-V

Pointers-introduction –Understanding pointers-accessing the address of a variable – declaring & initializing pointers.

File management- introduction – defining , Opening and closing a file –
I/O operation on files.

TEXT BOOKS:

PROGRAMMING IN ANSI C by E.Balagurusamy – Tata McGraw Hill Publications co .Ltd-Ed 2.1

REFERENCE BOOKS:

THE SPIRIT OF C by Mullish Copper-JAICO publications

ELECTIVE-III:ENERGY PHYSICS

UNIT-I

SOLAR ENERGY

Solar radiation at the earth's surface – Solar radiation measurements – solar cells for direct conversion of solar energy to electrical powers – solar cell parameters – efficiency – single crystal silicon solar cells – cadmium sulphide solar cells – Applications – solar heaters – solar cookers – solar green house

UNIT-II

WIND ENERGY

Basic principles of wind energy conversion- energy estimation - Generating systems – Schemes for electrical generation –generator control – local control – applications of wind energy – energy from waves and tides

UNIT –III

BIO MASS ENERGY

Bio mass energy – classification – Photosynthesis – biomass conversion process – gobar gas plants – wood gasification ethanol from wood – merits and demerits of biomass energy sources

UNIT – IV

ENERGY STORAGE

Lead acid batteries – rechargeable batteries – UPS – Hydrogen as fuel – liquid petroleum gas energy

UNIT – IV

IMPACTS OF NON- CONVENTIONAL ENERGY

Energy crisis- possible solutions – energy transportation – patterns of energy consumption in domestics, industrial agricultural sectors- global warming

Books for study

1. Solar energy – G.D. Rai , 1995 edition
2. Solar energy – S. P. Suhatme TMH Second edition 1997
3. Non conventional energy sources – G.D.Rai Fourth edition Khanna publications
4. Principles of Solar Engineering Kreith & Krieder TMH
5. Solar Energy – M.P Agarwal S Chand & Co.,

ELECTIVE IV - COMPUTATIONAL PHYSICS

UNIT – I:

Representing numbers in a computer – Machine precision – Introduction to numerical errors – Errors in mathematical approximations – Error propagation – Introduction to MATLAB – Workspace – Creating arrays – Matrix operators – Generating vectors – Accessing sub-matrices – Control flow statements – Infinite loops – Introduction to *M*-files – Graphics in MATLAB – Creating 2D graphs – Creating parametric function plots – Introduction to Mesh and Surface plots – Introduction to toolboxes.

UNIT – II:

Matrices and linear system of equations – Gauss-Jordan elimination method – Gauss method to compute the Inverse – LU decomposition – Cholesky decomposition – Review of rotation matrices – Householder transformation – QR decomposition – Gauss-Seidel iterative method – Eigenvalues and eigenvectors of a real symmetric matrix by Jacobi's method – Determination of largest eigenvalue by Power method.

UNIT – III:

Introduction to Lagrange polynomials – Numerical differentiation and integration – Trapezoidal single segment and multiple segment rules – Simpson's single segment and multiple segment rules – Newton-Cotes formulas – Romberg integration – Gaussian quadrature formula – Estimation of errors in evaluating the integrals – Introduction to random numbers – Random number generation – Monte-Carlo integration.

UNIT – IV:

Numerical solution of ordinary differential equations solution by Taylor's series – Euler's method – Runge Kutta methods with Runge's coefficients. Numerical solution of partial differential equations using finite difference method.

UNIT – V: Laboratory Exercise Session (1 hour per week)

The laboratory exercise involves writing programs in C / C++ / FORTRAN / MATLAB to solve problems of numerical techniques for the topics listed above.

Textbook

Richard Hamming. *Numerical Methods for Scientists and Engineers.* Dover publications.

Duane C. Hanselman and Bruce L. Littlefield (2004). *Mastering MATLAB 7*. Prentice Hall.

Supplementary Reading

J.M. Thijssen (1999). *Computational Physics*. Cambridge University Press.

Tao Pang (1997). *An Introduction to computational physics*. Cambridge University Press.

Rubin H. Landau (1997). *Computational Physics: Problem solving with computers*. John Wiley.

James B. Scarborough. *Numerical mathematical analysis*. Oxford IBH.

SAMPLE MODEL QUESTION PAPER

BSc(Physics)

MECHANICS AND SOUND

Time: Three Hours **Max** : **100 Marks**

Answer all the questions

Part- A (10 x 2= 20 Marks)

1. What are elastic and inelastic collisions?

2.Define coefficient of restitution.

3.What are Lissajou's figures?

4.Write down the expression for period of a bifilar pendulum with non parallel threads
.

5.Define centre of pressure.

6.Define coefficient of friction.
.

7.What are constraints?

8.Write down transformation equations
..

9.What is critical damping?

10.Define sharpness of resonance

Part- B (5 x 4= 20 Marks)

11.a) Find the velocity of projection of missile which has a horizontal range of 150m if its time of flight for that range is 3 s.

(Or)

b) Derive the relations for the velocities of two smooth spheres impinginging obliquely after impact.

12.a)Prove that in a compound pendulum there are four points collinear with the centre of mass of the pendulum about which it has the same period of oscillation

(Or)

b)What is a bifilar pendulum? Derive an expression for its period of oscillation.

13.a)Find the centre of gravity of a solid cone..

(Or)

b)Derive expression for the variation of atmospheric pressure with altitude.

14.a) State and explain the principle of virtual work

(OR).

b)Explain generalised coordinates.

15. a) Explain the properties of ultrasonic waves.

(Or)

b)State and explain Fourier theorem

Part C(5 x 12 = 60 Marks)

16.a)Derive expression for i)Time of flight ii)Maximum height and iii) Horizontal range of a projectile. (Or)

b)Two smooth spheres impinge directly. Find their velocities after impact. Also calculate the loss of kinetic energy.

17a)Find the resultant of two SHM's having the same period at right angles to each other. Discuss the result.

(Or)

b)What is a compound pendulum? Obtain an expression for its period of oscillation.Prove that the centre of oscillation and the center of suspension are interchangeable..

18a).Define cetre of gravity. Find the centre of gravity of a i) solid hemisphere ii)hollow hemisphere..

(Or)

b)Explain the equilibrium of a body on an inclined plane acted upon by a force.

19.a)Derive Lagrange's equations of motion from D' Alemberts principle

(Or)

b)Using Lagrangian formulation show that the angular momentum is conserved.

20.a) Define reverberation time. Derive Sabine's formula of reverberation time.

(OR)

b) Explain the methods of production of ultrasonic waves and mention its uses.