M.Sc. (F) Physics - 2013

Paper-: V- Advanced Quantum Mechanics & Quantum field Theory

Duration-:3hrs **Marks-: 100**

Note: - The question paper will contain three sections as under-

Section-A: One compulsory question having 10 parts with 02 parts from each unit, short answer in 20 words for each part. **Total marks: 10**

Section-B: 10 questions, 02 question from each unit, 05 questions will be attempted, taking one from each unit, answer approximately in 250 words. **Total marks: 50**

Section-C: 04 questions (question may have sub division) covering all units but not more then one question from each unit, descriptive type, answer in about 500 words, 02 question to be attempted.

Total marks: 40

Unit-I

Scattering (Non-relativistic)-: Differential and total scattering cross section, solution of scattering problem by the method of partial wave analysis, expansion of a plane wave into a spherical wave and scattering amplitude, optical theorem applications: scattering from the delta potential, square well potential and hard sphere, scattering of identical particles, energy dependence and resonance scattering, Breit Wigner formula, quasi stationary state, Lippman Schwinger equation and the Green's function approach for scattering problem, Born approximation and its validity for scattering problem, Coulomb scattering problem under first Born approximation in elastic scattering.

Unit-II

Relativistic Formulation and Direct equation: Attempt for relativistic formulation of quantum theory, Klein-Gordon equation, probability density and probability current density, solution of free particle K.G. equation in momentum representation, interpretation of negative probability energy solutions, Dirac equation for a free particle, properties of Dirac matrices and algebra of gamma matrices, non-relativistic correspondence of the Pauli equation (inclusive of electromagnetic interaction), Solution of the free particle, Dirac equations, orthogonality & completeness relation for Dirac spinors, interpretation of negative energy solutions & hole theory.

Unit-III

Symmetries of Dirac Equation: Lorentz boost, Lorentz covariance of Dirac equation, Proof of covariance & derivation of Lorentz transformation matrix and rotation matrices for Dirac spinors, projection operators involving four momentum & spin, parity (P), charge conjugation (C), time reversal (T) and CPT operators for Dirac spinors, bilinear covariant and their transformation behavior under Lorentz transformation, P, C, T & CPT, expectation values of coordinate & velocity involving only positive energy solutions, Zitter Bewegung, Klein paradox.

Unit-IV

Photon as a quantum mechanical excitations of radiation field, fluctuations and the uncertainty relation, validity of classical description, matrix element for emission and absorption, spontaneous emission in the dipole approximation, Rayleigh scattering, Thomson scattering & Raman effect, Radiation damping & resonance florescence.

Quantum Field Theory:- Scalar and vector fields, Classical Lagrangian field theory, Euler Lagrange's equation, Lagrangian density for electromagnetic field, occupation number representation for simple harmonic oscillator, linear array of coupled oscillators, second quantization of systems of identical bosons, second quantization of real Klein-Gordan field and complex Klein-Gordan field, meson propagator, second quantization of systems of identical bosons.

Unit-V

Occupation number representation for Fermions, second quantization of the Dirac field, Fermion propagator the e. m interaction & gauge invariance, covariant quantization of the free electromagnetic field, photon propagator.

S-Matrix: S-matrix expansion, Wick's theorem, diagrammatic representation in configuration space, momentum representation, Feynman rules of QED, Feynman diagrams of basic processes, Application of s-matrix formalism, Coulomb scattering, Bhabha scattering, Moller scattering, Compton scattering and Pair production.

References:-

1. Quantum mechanics, A modern approach-Ashok Das & A.C. Melissions (Gordon & Breach Science Publishers).
2. Quantum Mechanics (second edition)-E. Merzbeker (John Wiley)
3. Relativistic Quantum Mechanics -Bjorken & Drell (Mc Graw hill)
4. Advanced Quantum Mechanics -J.J. Sakurai (John Wiley & Sons)
5. Quantum mechanics-Thankpapn V.K. (Wiley Eastern ltd. New Delhi)
6. Quantum field Theory-F. Mandal & G Shaw (John Wiley)
7. Elements of Advanced Quantum Theory- J.M. Ziman (Cambridge)

Paper-: VI – Nuclear Physics

Duration-:3hrs **Marks:-100**

Note-: - The question paper will contain three sections as under-

Section-A: One compulsory question having 10 parts with 02 parts from each unit, short answer in 20 words for each part. **Total marks: 10**

Section-B: 10 questions, 02 question from each unit, 05 questions will be attempted, taking one from each unit, answer approximately in 250 words. **Total marks: 50**

Section-C: 04 questions (question may have sub division) covering all units but not more then one question from each unit, descriptive type, answer in about 500 words, 02 question to be attempted.

Total marks: 40

Unit-I

Two Nucleon System and Nuclear Forces: General nature of the force between nucleons, saturation of nuclear force, charge independence & spin dependence, general forms of two nucleon interaction, central, non-central & velocity dependent potential, analysis of the ground state (3S1) of deuteron using a square well potential, range depth relationship, excited states of deuteron, discussion of the ground state of deuteron under non central forces.

Unit-II

Nucleon-Nucleon Scattering & Potentials: Partial wave analysis of two neutron-proton scattering at low energy assuming a central potential with square well shape, concept of the scattering length, Coherent scattering of neutrons by protons in (ortho & para) hydrogen molecule, conclusion of these analysis regarding scattering lengths, range & depth of the potential, effective range theory (in neutron-proton scattering) and shape independence of nuclear potential, A qualitative discussion of proton- proton scattering at high energy, hard core potentials and Red hard core and soft core potentials, main features of the One Boson Exchange Potential (OBEP) (no derivation).

Unit-III

Nuclear shell Model: Single particle & collective motions in nuclei, assumption & justification of the shell model, average shell potential, spin orbit coupling, single particle wave functions and level sequence, magic numbers, shell model predictions for ground state parity, angular momentum and their comparison with experimental data, configuration mixing, single particle transition probability according to the shell model, selection rules, approximate estimates for transition probability and Weisskopf units, nuclear isomerism.

Collective nuclear models: Collective variables to describe the collective models of nuclear motion, Parameterization of nuclear surface, A brief description of the collective model Hamiltonian (in the quadratic approximation), vibrational modes of spherical nuclei, collective modes of deformed even-even nucleus and moments of inertia, collective spectra and electromagnetic transitions in even nuclei and comparison with experimental data, Nilsson model for the single particle states in deformed- nuclei.

Unit-IV

Nuclear Gamma & Beta Decay: Electric & Magnetic multipole moments and gamma decay probabilities in nuclear system (no derivation), reduced transition probability, selection rules: internal conversion & zero-zero transition.

General characteristics of weak interactions, Nuclear beta and lepton capture, electron energy spectrum and Fermi-Kurie plot. Fermi theory of beta decay (parity conserved selection rules Fermi and Gamow Teller) for allowed transition : ft-values, general interaction Hamiltonian for beta decay with parity conserving and non conserving terms, forbidden transition, experimental verification of parity violation.

Nuclear Reactions: Theories of nuclear reactions, partial wave analysis of reaction cross section: compound nucleus formations & break-up, resonance, scattering & reaction, Breit Wigner dispersion formula for S-Wave (l=0), continuum cross section: statistical theory of nuclear reactions, evaporation probability and cross section for specific reactions, electric quadruple & magnetic dipole moments, state mixture.

The optical model, stripping and pickup reactions and their simple theoretical description (Butler Theory) using plane wave Born approximation (PWBA), short comings of PWBA, nuclear structure studies with deuteron proton stripping (d,p) reaction.

Unit-V

Interaction of Neutrons, EM Radiation and Charged Particles with Matter: Law of absorption and attenuation coefficients, slowing down & law for neutron capture photoelectric effect, Compton Scattering, pair production, Klein Nishima cross section for polarized & unpolarized radiation, angular distribution of scattered photon & electrons, energy loss of charged particles due to ionization, Bremsstrahlung energy, target and projectile dependence of all three processes range energy curves straggling.

Experimental techniques: Gas filled counters, BF counter, scintillation counters, solid state detectors, surface barrier detectors, neutron activation detector, electronic circuits used with typical nuclear detector properties, chambers Nuclear emulsions techniques of measurement and analysis of tracks, proton synchrotron, electron accelerator and neutron generators, acceleration of heavy ions.

References:-

1. Theoretical Nuclear Physics: J.M. Blatt & V.E. WeissKipf.
2. Introductory Nuclear theory: -L.R.B. Elton, ELBS Publs. London 1959.
3. Nuclear physics: - B.K. Agarwal, Lok Bharti Prakashn. Allahabad 1989.
4. Nuclear Structure: -M. K. Pal, Affiliated East West Press, 1982.
5. Nuclear physics: - R.R. Roy & B.P. Nigam. Willy Basten, 1979
6.Structure of the Nucleus: - M.A. Preston & R.K. Bhaervi, Addison Wesley.
7. Introductory Experimental Nuclear Physics: - R.M. Singru Wiley Easten pvt. Ltd.
8. Nuclear Physics: - Techniques of Nuclear Structure (vol. I) England.
9. The Atomic Nucleus: - R.D. Evans Mc Graw Hill, 1955.

10. Introduction to Nuclear Physics:-H. Enge. Addison Wesley, 1970.
11. Elements of Nuclear Physics: - W.E. Burcham, ELBS Longman, 1988.
12. Concepts of Nuclear Physics: - B.L. Cohen, Tata Mc Graw Hill, 1988.
13. Nuclei & Particles -E. Segre, Benjamin 1972.
14. Nuclear Physics: - I. Kaplan, Addison Wesley 1963
15. Introductory Nuclear Physics:-D.Halliday Willey 1955
16. Introduction of Nuclear Physics & Chemistry:-Harvey.
17. The Physics of Nuclear Reactions:-W.M. Gibson, Pergamum Press.
18. Nuclear Interaction: - S. De Benedetti, Wiley 1955.

Paper-: VII- Solid state Physics

Duration-:3hrs **Marks:-100**

Note-: - The question paper will contain three sections as under-

Section-A: One compulsory question having 10 parts with 02 parts from each unit, short answer in 20 words for each part. **Total marks: 10**

Section-B: 10 questions, 02 question from each unit, 05 questions will be attempted, taking one from each unit, answer approximately in 250 words. **Total marks: 50**

Section-C: 04 questions (question may have sub division) covering all units but not more then one question from each unit, descriptive type, answer in about 500 words, 02 question to be attempted.
Total marks: 40

Unit -I

Lattice Vibrations and Thermal Properties: Lattice specific heat, theoretical estimates of Einstein and Debye temperatures, Wave mechanics of phonons, Creation and annihilation operators, Elastic waves and lattice vibration in one dimensional crystal, Long range forces and the reciprocal lattice method, Lattice vibration of a diatomic linear chain, Dispersion relation for three dimensional crystals, Born- Von Karmon boundary conditions and density of states, Experimental observation of phonon frequencies, equation of state of the crystal lattice, Thermal Conductivity of insulators.

Unit-II

Theory of Metals: Fermi Dirac Distribution Function, density of states, temperature dependence of Fermi energy, Specific heat, Boltzmann equation and mean free path, relaxation time and scattering processes, thermal conductivity and electrical conductivity (using F-D statistics). Widemann- Franz ratio, susceptibility, Drude's theory of light absorption in metals, Hall effect.

Band theory of metals: Bloch theorem, Kronig-penny model, Effective mass of electrons. Wigner-seitz approximation, nearly free electron model, tight binding method and calculation of density of states for S-band in simple cubic lattice, Cyclotron Resonance and Hall effect, de-Hass van Alphen effect, Experimental methods in determination of band structure, Limitations of band theory.

Unit-III

Semiconductors: Law of mass action, calculation of impurity conductivity, ellipsoidal energy surfaces in Si and Ge, Hall effect recombination mechanism, Optical transitions and Shockley Read theory, excitons, photoconductivity, photo luminescence.

Nano-Science and Nano-Technology: Introduction to nano-science, nano-technology and nano-materials, evolution of nano-technology from micro-technology.

Imperfection in solids: Point, line planer and defects, colour centers, F-Centre and aggregate centers in alkali halides, John Teller effect, Single crystal growth, crystal whiskers.

Unit-IV

Magnetism: Larmor diamagnetism, paramagnetism, Curie Langevin classical theory, Quantum theory of paramagnetism, susceptibility of rare and transition metals, Ferromagnetism: Weiss theory Quantum theory of Ferromagnetism, origin of domains, Bloch Walls, Anti ferromagnetism, Ferrites, Magnons, magnetic resonance, Nuclear magnetic resonance, magnetic materials.

Superconductivity: Electromagnetic Properties, Thermal properties, isotope effect and electron phonon interaction, microscopic theory of superconductivity, Mc Millan's formula (no derivation), High temperature superconductivity in cuprates, fullerenes (basic ideas), Organic supper conductors (basic ideas), Superconducting tunneling, application of super conductivity.

Unit-V

Quantum Statistics and Elementary Excitations of Electron Gas: Simple harmonic oscillator, Annihilation and creation Operators, coupled oscillators, linear chain, Bosons, Fermions, second Quantization, Hamiltonian for two particles, Fermions Boson Interaction, Landau theory of Fermi liquids.

Group theory: Group. Group Multiplications table, Representation of group (i) Representation of the triangle group (ii) Representation of the space group of a crystal.(iii) Normal modes of vibration of O_3 molecule.

References:

1. Intermediate Quantum theory of solids- A.D. E .Animalu, (Prentice Hall).
2. Solid state Physics-Kittel, (John Wiley 7th ed.).
3. Quantum theory of Solids- Kittel, (John Wiley).
4. Solid State Physics Source books- S.P. Parker, (Mc. Graw Hill).
5. Solid State Physics- Harrison, (Benjamin Press).
6. Quantum Solid State Physics-S.V.Vonsovsky & M.I. katsnelson, (Springer Verlag)
7. High.T. Superconductivity- Sinha, (Nova Science, New York USA)
8. Superconductivity-key Problem-Kaklioi, (Arihant).
9. Nano-Science & Nano Technology-Retner-Retner.

Paper –VIII (A) Microwave Electronics

Duration-:3hrs **Marks:-100**

Note-: - The question paper will contain three sections as under-

Section-A: One compulsory question having 10 parts with 02 parts from each unit, short answer in 20 words for each part. **Total marks: 10**

Section-B: 10 questions, 02 question from each unit, 05 questions will be attempted, taking one from each unit, answer approximately in 250 words. **Total marks: 50**

Section-C: 04 questions (question may have sub division) covering all units but not more then one question from each unit, descriptive type, answer in about 500 words, 02 question to be attempted.

Total marks: 40

Unit-I

Wave guides: Rectangular wave guides; wave equation and its solutions, TE & TM Modes, Dominant mode & choice of wave-guide dimension, methods of excitation wave-guide. Circular wave-guide : wave equations and its solutions (TE, TM &TEM modes), Causes of attenuation in wave guides, wall current & derivation of attenuation constant, Q of the wave guide.

Resonators (a) Resonant modes of rectangular & cylindrical cavity resonator of the cavity resonator frequency meter, (b) Ferrites: Microwave propagation in ferrites, Faraday rotation, Device employing Faraday rotation (Isolator Gyrator, circulator).

Unit-II

Microwave antennas: Magnetic currents, Electromagnetic current sheets, field of Huygen's source, radiation from a slot antenna, open end of a wave guide & electromagnetic horns, Radiation field of Micro strips wave guide, microstrip antenna calculations, Microstrip design formulas.

Microwave tubes: Space charge spreading of an electron beam, beam focusing, Klystron: Velocity Modulation, Two cavity Klystron, Reflex Klystron, Efficiency of Klystron, Magnetron-Types and description, theoretical relation between electric & magnetic field of oscillation, Modes of oscillation, & operating characteristics, Travelling wave tubes O & M type travelling wave tubes.

Unit-III

(a)Avalanche transit time Device: Read diode, Negative resistance of an avalanching P-N diode IMPATT oscillator.

(b)Transferred Electro Device: Gunn effect, Two valley model, high field domains, different modes for microwave generation.

Parametric Amplifier: Varactor, Equation of capacitance in linearly graded & abrupt P-N junction, Manley –Rowe relations, parametric up converter and negative resistance parametric amplifier, use of circulator, Noise in parametric amplifier.

Unit-IV

Microwave measurement: Power, frequency, Attenuation, Impedance (use of smith Chart) VSWR Directivity, Coupling Reflectometer, complex permittivity of materials and its measurements. Definition of complex permittivity, loss tangent-their importance and correlation, Measurement of complex permittivity of solids, liquids and powder, using shift of minima method, Introduction to frequency perturbation method & Hestenet method of evaluate complex permittivity of materials.

Unit-V

Microwave filters: Basic theory, Quarter wave & direct coupled cavity filters.

Passive Device: Termination (short circuit & matched termination) Attenuator, Phase changers E & H plane Tees, hybrid junctions, Directional coupler.

Monolithic Micro Wave Integrated Circuits: Substrate materials, Conductor materials, Dielectric & resistance films, Fabrication techniques, monolithic integrated circuits.

References:

1. Theory of Applications of Microwaves-AB Brownwell & R.E. Beam Mc Graw Hill
2. Introduction to Microwave Theory- Atwater, Mc Graw Hill.
3. Microwave Electronics-R.F. Soochoo, Addisey Wesley Publi. Company
4. Foundation of Microwave Engineering-R.E. Collins, Mc Graw Hill.
5. Solid State Physical Electronics-A.Vanderziel, PHI India
6. Semi-Conductor & Electronic Devices-M. Barler, PHI India
7. Hand book of Microwave Measurement-M. Sucher & J. Fox. Vol-II Polytechnic Press, New York.
8. Microwave Devices & circuits-S.Y. Liao. PHI India
9. Solid State Physical Electronics-B.G. Strcetman.PHI India
10. Microwave Principles-H.J. Reich, CBS
11. Principles of Microwave Circuits-G.C. Montgomery, Mc Graw Hill
12. Micro strip Antenna Tech-K.R. Carver & J. W. Finic I.E.T.E. Trans
13. Build Microstip Antenna with paper thin dimension-I.J. Bahi, Microwave Journal vol.18 pg 50-60
14. Antenna theory & Design- R.S. Edlliott, PHI Ltd India.

15. Antenna theory & Design-E.Wolff, J. Wiley & Sons.
16. Microstrip Antenna-Bahl & Bhartiya, Artech House Messachusetts.
17. Microwave Electroics-R.F.Soohoo A. Dalisaon Wesley Publ. Compo Massachusetts.

OR

Paper VIII (B)-High Energy Physics

Duration-:3hrs **Marks:-100**

Note-: - The question paper will contain three sections as under-

Section-A: One compulsory question having 10 parts with 02 parts from each unit, short answer in 20 words for each part. **Total marks: 10**

Section-B: 10 questions, 02 question from each unit, 05 questions will be attempted, taking one from each unit, answer approximately in 250 words. **Total marks: 50**

Section-C: 04 questions (question may have sub division) covering all units but not more then one question from each unit, descriptive type, answer in about 500 words, 02 question to be attempted.
Total marks: 40

Unit-I

Discovery of Muon, mesons, pions, nucleon interaction and isospin analysis, Discovery of resonances and stranger particles, Gell-Mann Nishima Scheme, K-decays, strangeness oscillation and Ko regeneration phenomenon, Discovery of j/p Si Particles, charm and bottom flavours.

Qualitative ideas of interactions, QED, QCD weak interaction, Addition conservation laws, Charge, colour, Baryon number, lepton number, flavour etc. and particle decays.

Unit-II

Invariance and operators in Quantum mechanics, Translations and rotations, Parity, tests of Parity conservation, charge conjugation invariance, eigen state of charge conjugation operators, Positronium decay, Experimental taste of E-invariance, Time reversal invariance, Tests of CPT invariance,

SU (2) of isospin, Isospin of two nuclear system, isospin for antiparticles C-party, SU (3) (colour and flavour), quark-antiquark states, mesons, 3 quark states, Baryons magnetic moment, Heavy quark: charm and beyond, Hardon masses colour factors.

Unit-III

Non-relativistic time dependent perturbation theory, Rules for scattering amplitudes in Feynmann-Struckelberg approach cross section in terms of invariant amplitude M variables, Decay Rates in terms of M invariants, An electron interacting in field, calculating, cross section for $e^+e^- \to e^+e-$ Moller scattering and e.m. scattering arid process $e^+e^- \to e^+e-$. Helicity conservation of high energies in lab frame, Kinematice relevant to the parton model.

Unit-IV

Photons and their polarization vectors propagators of (I) Spinless particles (II) electron (III) photon, The prescription for propagators, summary of Feynmann rules for QED, producing a charge distribution with electrons, form factors, e-p scattering ep-ex formalism for analyzing as (Virtual) photon-proton, total cross section and Bjorken scaling, Quarks with in the proton gluons.

Unit-V

Classification of weak interactions: Nuclear Decay, Fermi theory, Inter partition of coupling, G-parity violating and V-A form of weak current Cobalt-60 experiment, Parity violation in B-decay, Experimental determination of neutrino helicity, Lepton helicities in pion and muon-decay, weak decays of strange particles: Cabibbo theory, Quantitative ideas about discovery of $W^{\pm}$ and Z^{0}.

Reference:-

1. Introduction to High Energy Physics_ D.H. Perkins.
2. Quarks and Ieptons- Halzin and Martin.

OR

Paper VIII- (C) Solid State Electronics

Duration-: 3hrs **Marks:-100**

Note-: - The question paper will contain three section as under-

Section-A: One compulsory question having 10 parts with 02 parts from each unit, short answer in 20 words for each part. **Total marks: 10**

Section-B: 10 questions, 02 question from each unit, 05 questions will be attempted, taking one from each unit, answer approximately in 250 words. **Total marks: 50**

Section-C: 04 questions (question may have sub division) covering all units but not more then one question from each unit, descriptive type, answer in about 500 words, 02 question to be attempted. **Total marks: 40**

Unit-I

Semiconductor Physics: Energy band diagrams of actual semiconductors likes Si, Ge and GaAs, impurity doping and impurity energy levels, Calculation of Fermi level and conductivity of semiconductors, Injection of carriers, diffusion, Drift and continuity equation (band to band), trap assisted and Auger recombination, low injection and high injection, quasi Fermi levels.

Unit-II

Poly crystalline and Amorphous Semiconductors: Semiconductor surfaces, surface charge and surface barrier, poly crystalline semiconductor, properties of grain boundaries, poly silicon as gate material, electrical conduction in amorphous semiconductors, mobility edge band, details and dangling band States.

Unit-III

Semiconductor Diodes: PN junction, Depletion region capacitance, current voltage relation, recombination in space charge region and diode ideality factor, junction breakdown and avalanche multiplication, a-c response, diffusion capacitance, switching properties, reverse recovery, PINB diode hetro junctions, metal semiconductor barrier, Schottky thermionic and diffusion currents and measurement of barrier height.

Unit-IV

Bipolar Transistors and Thyristors: General characteristics of Bipolar junction transistors, voltage rating, factors controlling current gain, frequency performance, power transistors, switching of bipolar transistor, basic concept of PNPN structures, thyristor’s turn on, turn off and power consideration triacs.

Unit-V

JFETS, MESFETS and MOSFETS: JFET modeling including saturation velocity effects, GaAs MESEFT, MOS diodes, surface space charge regions, suface states, MOSEFT, surface space charge region under no equilibrium condition channel conductance, basic characteristics, current voltage and device parameters.

References:-

1. Semiconductor Physics-K Seeger, Springer-Verlag
2. Solid state and Semiconductor Physics- John p. McKinley, Harper & Row
3. Semi-Conductors Devices- G Mnnes, Integrated Electronics Van Nostrand
4. Physics of Semiconductor Devices- S. M. Sze. Wiley

M.Sc. Final Practical Physics

Time 12 hrs. **Marks: 200**

Note: There will be two experiments of 6 hour duration each for two days. The distribution of marks will be as follows.

(A) Two experiments	125marks
(B) Record	25 marks
(C)Viva voce	25marks
(D) Seminar	25 marks
(Write-up with references are to prepared & submitted during exam)	
Total -	**200 marks**

List of Experiments:

1.Determine fine structure constant using sodium doublet
2.Verify Cauchy's relation & determination of constants.
3.To determine e/m for an electron by Zeeman effect.
4.Determine the dissociation energy of Iodine molecule.
5.Study the characteristics curve of klystron.
6.Determine the dielectric constant of turpentine oil with the help of Leacher wire system.
7.Determination of energy of a given ray from Re-De source.
8.Find out the percentage resolution of given scintillation spectrometer using Cs-137.
9.Find out the energy of a given X-ray source with the help of a scintillation spectrometer.
10. Plot the Gaussian distribution curve for a radioactive source.
11. To study the frequency and phase characteristics of band phase filter.
12. Study the wave from characteristics of transistorized a stable symmetrical multivibrator using CRO & determines its frequency by various C & R.
13. Artificial transmission line.
14. To study the mode characteristics of reflex klystron and hence to determine mode number, Transmit time, Electronic, Tunning range, electronic tunning sensitivity.
15. To study the E-plane radiation of pattern of pyramidal horn antenna and compute the beam width of the antenna.
16. To study the H-plane radiation of pattern of pyramidal horn antenna and compute the Directional gain of the antenna.
17. Determine the electric constant of a given sample at Microwave frequency.
18. Determine the electric constant of a Benzene using plunge technique at room temperature.
19. To determine the unknown impedance using slotted line section smith chart in the K-band.
20. To study the Microwave absorption in dielectric sheets.
21. To determine the e/m of an electron by magnetron valve method.
22. To determine the velocity of waves in water using ultrasonic interferometer.
23. To determine the magnetic susceptibility of two given samples by Gouy's method.
24. Determination of Land's 'g' factor for IRRH crystal using electron spin Resonance spectrometer.
25. To determine e/k using transistor characteristics.
26. To study dark and illumination characteristics of p-n junction solar cell and to determine (i) its internal series resistance (ii) Diode ideality factor.
27. To study the characteristics of following semiconductor devices (i) VDR (ii)Photo transistor (iii) Thermistor (iv) IED
28. To study the characteristics of MOSTET and MOSFET amplifier.
29. To study dark and illumination characteristics of p-n junction solar cell and to determine its.(i) maximum power available (ii) Fill factor.
30. Any other experiments of the equivalent standard can be set.