VEER NARMAD SOUTH GUJARAT UNIVERSITY

S. Y.B. Sc.

Physics Paper III.

(For Electronics Principal)

Syllabus in force from 2003- 04.

1. Mechanics :

Regid body motion, moment of inertia and their products. Principal moments and axes. Euler's equations , Symmetrical top and Solid Sphere

2. Waves and Oscillations:

Forced Oscillation, resonance, band width energy equation with damping and Q-velue. Applications of free, damped and forced oscillations.

3. Geometrical Optics :-

Fermat's principle, Laws of reflection and refraction, Principle of extremum path

Aberration in images, chromatic aberrations, achromatic combination of lenses in contact and Separated lenses, Monochromatic aberrations and their reduction, Spherical mirrors and Schmidt corrector plates, aplanatic points, oil immersion objectives, meniscus lens.

4. Physical Optics :-

polarization : plane of polarization, polarization by reflection, Brewster's Law, polarization by refraction, Malu's Law , double refraction in uniaxcial Crystals, its electromagnetic theory, phase retardation plates, double image prism. Rotation of plane of polarization, origin of optical rotation in liquids and in crystals. Polarimeters and Laurent half shade polarimeter. Spectrographs and Various Kinds of Spectra.

5. Vectors:-

Review of Guass, Stoke and Green's theorems With their applications. Orthogonal Curvilinear Co-ordinates, Unit Vectors in Curvilinear Systems, area and Volume elements, Gradient, divergence and Curl, Cylindrical Co-ordinates, Spherical Co-ordinates .

6. Complex Variables:-

Complex Variables, derivatives, Cauchy's Reimann equations, Integration, Cauchy's theorem, Cauchy's formula and its derivation, Residue theorem, contour integration and evaluation of definite integrals.

Text and Reterence books:-

1. D. S. Mathur " Elements of properties of matter " (S. Chand & Co, Delhi)
2. D. S. Mathur " Mechanics " (vikas Publishing House Pvt. Ltd. Bombay)
3. G. S. Sharma and D. N. Bhargava " A text book of Mechanics " Tenth revised Edition 1994.

   (Batan Prakashan Mandir , Agra-2)
4. D. P. Khandelwal " Oscillations and waves" (Himalaya Publishing House Bombay)
5. I. G. Main " Vibrations and waves" (Cambridge University press)
6. H.J.pain , " The Physics of vibrations and waves " (Mc Milan 1975)
7. D. P. Khandelwal " optics and atomic physics " (Himalaya Publishing House, Bombay 1988)
8. Y.R. Waghmare " Classical Mechanics "

   (Prentice Hall of India, New Delhi, 1990)
9. A. K. Ghatak " Physical optics "
10. R.S. Longhurst " Geometrical and Physical optics (Longmans. 1966)
11. M. R.Spiegel " Vector Analysis " Schaum Series, McGraw Hill.
12. Gupta and B. S. Rajput, " Mathematical Physics, " (Pragati Prakashan, Meerut .)
13. Gupta, yadav and Malik, " Mathematical Physics " (Kedarnath and Sons, Merrut.)

VEER NARMAD SOUTH GUJARAT UNIVERSITY

S. Y.B. Sc.

Physics paper IV

(Fro Electronics Principal)

Syllabus in force from 2003 - 04.

1. Relativity :-

Reference Systems, inertial Frames Galilean invariance and Conservation laws, propogation light, Michelson- Morley experiment, Search for ether.

Postulates for the special theory of relativity Lorentz transformations, length contraction time dilation, velocity addition theorem, variation of mass with velocity, mass energy equivalence, particle with a zero rest Mass.

2. Quantum Mechanics :-

Origin of the quantum theory, Failure of Classical physics to explain the phenomena Such as black-body Spectrum, photoelectric effect, Ritz combination principle in Spectra, Stability of an atom, planck's radiation Law, Einstein's explanation of photoelectric effect, Bohr's quantization of angular momentum and its applications to hydrogen atom, Limitations of Bohr's theory.

Schrodinger's equation, Postulatory basis of quantum mechanics, Operators exepectation Values, transition probabilities, applications to free porticle and particle in one and three dimensional boxes. Step potential.

3. Atomic Physics :-

Spectra of hydrogen, deuteron and alkali atoms, spectral terms, doublet fine structure, Screening comstants for alkali Spectra for s, p, d, and f States, Selection rules.

Singlet and triplet fine structure in alkaline earth Spectra, Introduction of Zeeman effect, L-S and J-J Couplings.

4. Solid State physics :-

Crystalline and glassy forms, liquid crystals, Description only glass transition. Crystal Description only structure, periodicity, Lattice and basis, fundamental translation Vectors. Miller indices, Unit cell, Wigner Seitz cell, allowed rotations, lattice types, Lattice planes, common crystal Structures.

Mognetic Materials, Ferromagnetism and ferri magnetism Domain Structure Hysteresis loop. Eddy Cunent losses, soft magnetic materials.

5. Nuclear Physics :-

Structure of nuclei , basic properties (I) Q and binding Energy), deuteron binding energy, p-p and n-p Scattering and general Concepts of nuclear forces. Beta decay, range of alpha porticle, Geiger Nuttal law.

6. Lasers:-

Purity of specral line, coherence length and Coherence time, spatial Coherence of Source. Einstein's A and B Co-efficients. Spontaneous and induced emissions. Conditions for Laser action, Population inversion. Pulsed Lasers and tunable lasers. Applications of Laser.

Text and Reference books:-

1. H. S. Mani and G. K. Mehta " Introduction to Modern physics " (Affiliated East west press, 1989)
2. A. Beiser, " perspectives of Modern physics "
3. H. E. White, " Introduction to Atomic physics.
4. R. P. Feymann, R. B. Leighton and M Sands " The Feymann Lectures on Physics " Vol. 3. (B.I.Publications, Bombay, Delhi, Calcutta, Mandras)
5. T. A. Littlefield and N. Thorley " Atomic and Nuclear Physics " (Engineering Language Book Society)
6. H. A. Enge , " Introduction to Nuclear Physics " (Addision - Wesly.)
7. Eisenberg and Resnik, "Quantum physics of Atoms, Molecules, Solids, Nuclei and Particles " (John Wiley).
8. D. P. Khandalwal, " Optics and Atomic Physics " (Himalaya Publishing House Bombay, 1988).
9. C. Kittel " Introduction to Solid State Physics " 5^{th} Edition. (John Wiley and Sons, New York. 1976)
10. J. S. Blackmore , " Solid State Physics " 2^{nd} Edition , 1985(Cambridge University press, Cambridge)
11. N. W. Ascroft and N. D. Mermin " Solid State Physics " (Holt, Rine, Hart and Winston, New York, 1976)
12. A. E. Gupta and Dipak Ghosh, " Atomic and Nuclear Physics " 1^{st} Edi. 1997 (Books and Allied (P) Ltd. Calcutta).
13. A. K. Ghatak and S. Loknathan, " Quantum Mechanics " The Macmillan Co. of India Ltd, New Delhi.
14. P. M. Mathews & K. Venkatesham , " A text book of Quantum Mechanics" Tata McGraw Hill Publication Co. Ltd. New Delhi.
15. Satya Prakash and C. K. Singh " Quantum Mechanics " Kedarnath Ramnath & Co. Merrut.
16. S. L. Kakani & H. M. Chandalia, " Quantum Mechanics " Sultan Chand & Sons.
17. B. B. Laud, " Lasers and Non- linear optics " 2^{nd} Edi. 1991 (New Age Interuational (P) Ltd. Publication, New Delhi .)
18. William T.Silfvast , " Laser Fundamental " 1^{st} . South Assianedi 1998. (Cambridge University Press. New Delhi.)
19. V. Raghavan, " Materials Science and Engineering. A First Course. " prentice Hall of India. New Delhi. 4^{th} . Edition(2000).

VEER NARMAD SOUTH GUJARAT UNIVERSITY

S. Y.B. Sc.

(For Electronics principal.)

Syllabus in force from 2003 -04 .

Physics Practices for paper III & IV.

Group (A)

1. To determine moment of Inertia of a flywheel about it's own axis of rotation.
2. Study of Resonance pendulum' (Using Telescope)
3. To Study Simple harmonic motion. Under damped oscillations and to Calculate (i) Time period of oscillations (ii) augular frequency (iii)Relaxation time ' r ' and (iv) quality factor of the oscillation
4. Young's modulus by elevation method.
   (i) With Constant length (ii) With Constant mass.
5. Cauchy's Constant
6. Measurement of wavelength of light of a manochromatic Source using " Biprism "
7. Spherical aberration of a thick lens.
8. To Verify Malu's law for plane polarized light with the help of photo- voltaic cell.
9. Specific rotation of an optically active Substance (polarimerer)
10. optical lever (Finding radii of curuatures of Lens and hence to find retractive index for lens material)
11. Resolving power of prism.
12. To determine the refractive indices of o-ray & E-ray using double refracting prism.
13. Numerical Solution of Equation of motion (Using Computer) (Demonstration)

Group (B)

1. Determination of Planck's Constant by photocell.
2. Determination of e/m using Thomson's tabe.
3. Determination of e by Millikan's method.
4. Determination of e/ m using Zeemen effect.
5. Study of hydrogen Spectra (Rydberg Constant and ratio of masses of electrom to proton.)
6. Absorption Spectrum of iodine vapour.
7. Study of alkali or alkaline earth Spectra using a Concave grating
8. Study of Zeeman effect for determination of Lande g-factor.
9. Determination of magnetic suseeptibitity of Solution.
10. Hall- probe method for measurement of magnetic field.
11. Study of laser as a monochromatic coherent Source.
12. Study of divergence of a Laser beam.

Veer Narmad South Gujarat University, Surat

S. Y. B. Sc.

Physics

Paper – V

(For Electronics Principal)

(2006 – 07)

1. **Thermometry** :

Thermometry, types of thermometers, platinum resistance thermometer, Seebeck effect, hermoelectric thermometer, standardization and temperature scale, absolute zero and ice point, low temperature measurement, high temperature measurement.

BS:1.2, 1.3, 1.15 to 1.17,1.19 to 1.22.

2. **Photometry : -**

Sensitivity of the human eye, luminous intensity of a source, luminance and brightness, luminous efficiency of a source, illumination of a surface, typical photometers, brightness of images, viewing of stars through a telescope, the human eye.

DPK: 25.1 to 25.9

3. Resolving Power of Optical Instruments :

"Geometrical " and "Spectral " Resolution. Distinction between "Magnification" and "Resolution". Rayleigh Criterion for limit of resolution, resolving power of a diffraction grating, resolving power of a prism, some devices for high spectral resolution, resolving limit of a telescope. Michelson's stellar interferometer, resolution in a microscope, resolution with coherent illumination. Abbe's theory, phase contrast microscope, determination of spectral resolving power, determination of resolving power of a telescope.

DPK : 15.1 to 15.13.

3. Dielectrics and Related Properties:

Ferroelectricity, Piezoelectricity, effects of dielectrics, important requirements of good insulating materials, some important insulating materials.

SOP :Chap. (11) VII, VIII, XVI, XVII, XVIII.

4. **Superconductivity :**

Historical introduction, survey of superconductivity, mechanism of superconductors, effects of magnetic field, A.C. resistivity, critical currents, flux exclusion- The Meissner effect, the energy gap, type I and type II superconductors, London equations- Electrodynamics, a survey of B.C.S. theory, B.C.S. theory, quantum tunneling, Josephson's tunneling, new superconductors, potential applications of superconductivity.

SOP:Chap.(8) I to VII,IX,XIII,XIV, XVII,XVIII, XIX, XX, XXII, XXIV.

5. **X-rays:**
   Introduction, spacing between three dimensional lattice planes, the powder crystal method, the Laue method and rotating crystal method. RM: 7.1, 7.3, 7.8, 7.9.

6. **Nuclear magnetic resonance spectrometer :**
   Principle of NMR, constructional details of NMR spectrometer, sensitivity enhancement for analytical NMR spectroscopy. RSK :11.1 to 11.3.

7. **Mass spectrometers :**
   Basic mass spectrometer, types of mass spectrometers, components of mass spectrometers. RSK : 10.1 to 10.3.

: Text and Reference Books :

1. BS : Heat and Thermodynamics : By Brijlal and N. Subrahmanyam.
   S. Chand & Company(16^{th} Ed.)
2. DPK: Optics and Atomic Physics : By D. P. Khandelwal
   Himalaya Publishing House (Ed. 1989)
3. SBA : A text book of Optics : by N. Subrahmanyam, Brijlal and M.N.Avadhanulu
   S.Chand & Co., Ltd, (Ed. 2006)
4. SOP : Solid State Physics : By S.O.Pillai , New Age International Pub. (4^{th} Ed.)
5. RM : Modern Physics : By R. Murugeshan, K. Sivaprasath,S. Chand & Co. Ltd.,
   (Ed. 2005)
6. RSK: Handbook of Analytical Instrumentation by R.S. Khandpur, Tata Mc -Graw Hill Pub.(Ed. 1989)

Veer Narmad South Gujarat University, Surat

S. Y. B. Sc.

Physics Practical

Paper – V

(For Electronics Principal)

Group – C

1. To estimate temperature of flame.
2. Cardinal points of a lens system by goniometer.
3. Hartmann's formula (Spectrometer)
4. Wavelength of monochromatic light by cylindrical obstacle.
5. Resolving power of telescope
6. Resolving power of grating.
7. Viscosity of liquid by log-decrement.
8. Mutual inductance by ballistic galvanometer.
9. Energy band gap of a semi conductor using diode.
10. Measurement of thermo- emf and it's dependance on temperature interval in a thermocouple..
11. To study crystal structure of a material by X – ray diffraction method (D)
12. Geiger Muller Counter (D)