VEER NARMAD SOUTH GUJARAT UNIVERSITY

S.Y.B.Sc.

Physics

Paper III

(For Industrial Chemistry 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 oscillations, resonance, band Width, energy equation With damping and (Q) Value . Applications of free, damped and forced oscillations.

(3) Optics :

Polarization :- Plane of Polarization, polarization by reflection, Brewster's Law, Polarization by refraction, Malus Law, double refraction in Uniaxial Crystals, its electomagnetic Theory, Phase retardation plates, double image prism.Rotation of plane of Polarization, origin of optical rotation in liquids and in crystals, Polarimeters Laurent half shade polarimeter, Spectographs and various Kinds of Spectra.

(4) Lasers:-

Purity of Spectral line, Coherence Length and coherence time, Spatial Coherence of Source. Einstein's A and B Co-officients, Spontaneous and induced emissions. Conditions for Laser action, population inversion. Pulsed Lasers and tunable lasers. Applications of Laser.

(5) Experimental Methods:-

Introduction, Definition of Terms. Calibration, Standards, Dimensions and Units. The Generalized mesurement System. Basic concept in Dynamical Measurements. System Response. Distortion. Impedance Matching.

Basic Electrical Measurements and SenSing Devices. Introduction, forces of Electromagnetic origin. Wave form Measures, Basic Analog Meters, Basic Digital Meters, Basic input circuits. Amplifiers, Differential Amplifiers, operational Amplifiers, Transformers, power Supplies, Signal Conditioning. The Electronic Voltmeter (EVM), Digital Voltmeters. The Oscilloscope, sampling oscilloscopes, oscillographs, Counters- Time and Frequency Measurements.

Transducers, the Variable Resistance Transducer , the Differential Transformer (LVDT), Capacitive Transducers, Piezoelectric Transducers, Photoelectric Effects, Photoconductive Transducers, Photovoltaic cells, Ionization Transducers, Magnetometer Search coil. Hall effect Transducers, Digital

Displacement Transducers, Comparison of Analog and Digital Instruments, Summary.

Air-Pollution Sampling and measurement, Introduction. Units for Pollution Measurement, air pollution standards, general Air- Sampling Train, Gas Sampling Techniques Particulate Sampling Techniques, Sulfur Dioxide Measurements. Combustion Products Measurements. Opacity Measurements, Odor Measurement.

Text and Reference 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 wanes"
(Himalaya Publishing House, Bombay.)

5. I. G. Main " Vibrations and waves"
(Cambridge University Press)

6. H. J. Plain " 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. Wagmare " Classical Mechanics "
Printice Hall of India, New Delhi, 1990.)

9. B. B. Laad, " Lasers and Non-linrear optics" second Edi. 1991.
(New Age International (P) Ltd. Pub. New Delhi)

10. William T. Silfvast, " Laser Fundamentals " 1st. South Assianedi 1998.
(Cambridge University Press, New Delhi)

11. J. P. Holman, " Experimental Methods for Engineers. "
(McGraw - Hill International Edi. 1994.)

VEER NARMAD SOUTH GUJARAT UNIVERSITY

S. Y. B. Sc.

Physics

Paper . IV

(For Industrial Chemistry Principal)

Syllabus in force from - 2003-04

1. Quantum Mechanics :-

Origin of the quantum theory, Failure of classical physics to explain the phenomenon Such as blackbody 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, expectation Values, transition probabilities, Applications to particle in a one- and three dimensional boxes. Harmonic oscillator.

2. Atomic Physics : -

Spectra of hydrogen, deuteron and alkali atoms - Spectral terms, doublet fine Structure. Screening constant for alkali spectra for s. p. d. and f States selection rules. singlet and triplet fine structure in alkaline earth spectra, L- S and J- J Couplings.

3. Solid State Physics : -

Crystalline and glassy forms, liquid crystals, glass transition. Crystal structure Periodicity, Lattice and basis, fundamental translation Vectors. Unit Cell, Wigner - seitz cell.

4. Nuclear Physics :-

Structure of nuclei, basic properties (I) Q and binding energy) , deuteron binding energy, p-p and n-p Scettering and general concepts of nuclear forces.

5. Electronics :-

The Junction Transistor, transistor current components, Transistor as an amplitier, Transistor construction. The Commen- base Configuration. The common emitter configuration The Common Collectior Configuration.

Digital (Binary) Operation of a System. The OR Gate, the AND Gate, The NoT or Inverter circuit. Transistor Switching Times, The INHIBIT (ENABLE) operation, The EXCLUSIVE OR Circuit - De Morgan's Laws, the Boolean Algebra &

its applications, the NAND and NOR Diode - Transistor Logic, (DTL) Gate, Transistor - Transistor Logic (TTL) Gate, Comparison of Logic Families, References.

The Junction Field - Effect Transistor, The Pinch-off Voltage (Vp), The JFET Volt- Ampere Characteristics The Metal Oxide Semiconductor FET (MOSFET).

Classification of Amplifiers, R. C. Coupled amplifiers and its frequency response, The feedback concept, types of feedback , The transfer Gain With Feedback General Characteristics of Negative Feedback Amplifiers.

The Basic Operational Amplifier, The Differential Amplifier, The Emitter-coupled Differential Amplifier, Transfer Characteristics of a Differential Amplifier, An Example of an IC Operational Amplifier, Offset Error Voltage and Currents, Temperature Drift of Input offset Voltage and Current, Measurement of operational Amplifier parameters, Frequency Response of Operational Amplifiers.

Text and Reference Books:

1. H.S. Mani and G. K. Mehta " Introduction to Modern physics " (Affiliated East-West Press. 1989.)
2. Beiser "Prospective of Modern Physics "
3. H. E. White " Introduction to Atomic physics ".
4. R.F. Feymann, R. B. Leighton and M Sands. "The Feymann Lectures of Physics " Vol-3

   (BI Publications, Bombay, Calcutta, Madras).
5. T. A. Littlefield and N. Thorley "Alomic and Nuclear Physics "

   (Engineering Language Book Society)
6. H. A. Enge " Introduction to Nuclear Physics "

   (Addision - wesly)
7. Eisenburg and Resnik, " Quantam Physics of Atoms, Molecules. Solids, Nuclei and Particles"

   (John Wiley)
8. D. P. Khamdelwal " Optics and Atomic Physics "

   (Himalaya Pubilishing House, Bombay , 1988)
9. C. Kittel, " Introduction on Solid State Physics " 5^{th} Edition.

   (John wiley and Sons, New York 1976)
10. J. S. Blackemore " 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. B. 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 " Quantm Mechaincs" The Macmillan Co. of India Ltd. New Delhi.
14. P. M. Mathews & K. Venkatesham, " A text Book of Quantum Mechanics " Tata McGrow Hill Publication, Co. Ltd., New Delhi
15. Satya Prakash & C. K. Singh " Quantum Mechanics " Kedarnath Ramnath & Co. Merrut.
16. S. L. Kakani & H. M. Chandalia " Quantum Mechanics " Sultan Chand & Sons.
17. J. Millman and C. C. Halkias, " Integrated Electronics "

    (McGraw Hill 1972.)
18. B.L. Theraja, "Basic electronics-Solid State."

    (S. Chand and Co. Delhi)

VEER NARMAD SOUTH GUJARAT UNIVERSITY

S. Y. B.Sc.

Physics

(For Industrial Chemistry Principal)

Syllabus in force from 2003-04

Physics Practical for Paper. III & IV.

Group (A)

1. To determine moment of Inertia of a fly wheel 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) angular frequency (iii) Relaxation time ' r ' and (iv) quality factor -Q 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 monochromatic Source using "Biprism"
7. Spherical aberration of a thick lens.
8. To Veryfy Malu's law for plane polarizad light with the help of photo-voltaic Cell.
9. Specific rotation of an optically active Substance (Polarimeter)
10. Optical Lever (Finding radii of Curvatures of lens and hence to find refractive index for lens material)
11. Resolving power of prism
12. Study of Laser as a monochromatic Coherent Source.
13. Numerical Solution of equantion of motion (Demonstration) (Using Computer)

Group (B)

1. Determination of Planck's Constant by photocell.
2. Absorption Spectrum of iodine Vapour
3. Rydberg's Constant.
4. Study of Signal Stage CE, CB and CC Amplifier
5. Study of NAND gate as a Universal gate
6. Study of NOR gate as a Universal gate
7. Characteristics of Junction Field Effect Transistor. (JFET)
8. Study of a JFET Amplifier.
9. Study of Negative Voltage Feed back Amplifier.
10. Study of operational Amplifier (CMRR, Voltage follower) - (I)
11. Study of Operational Amplifier (Inverting and Non - inverting mode) - (II)
12. To find e/ m by Thomson's method.
13. Study of Cathode Ray Oscilloscope (CRO) . (Demonstration)

Veer Narmad South Gujarat University, Surat

S. Y. B. Sc.

Physics

Paper – V

(For Industrial Chemistry Principal)

(2006 – 07)

1. **Optical Instruments :**

   Entrance pupil and exit pupil, field of view, need for multiple -lens eye piece, Huygen's eyepiece, Ramsden eyepiece, Gaussian eyepiece, Kellner's eyepiece, comparison of Huygen's, Ramsden's and Kellner's eyepieces, compound microscope, ultra-microscope, telescope.

   DPK: 6.1 to 6.11

2. **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 Stellar interferometer, resolution in a microscope, resolution with a 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. **X-ray spectrometers:**

   X-ray spectrum, instrumentation for X-ray spectrometry, X-ray diffractometer, X-ray absorption meter, X-ray fluorescence spectrometry, electron probe microanalyser.

   RSK: 15.1 to 15.6

4. **Radio Chemical Instruments:**

   Fundamentals of radio chemical methods, radiation detectors, pulse height analyzer, gamma spectrometry, radio isotope scanners for medical applications, the gamma camera.

   RSK: 14.1 to 14.6

5. **Nuclear Magnetic resonance Spectrometer:**

   Principle of NMR, constructional details of NMR spectrometer, sensitivity enhancement for analytical NMR spectroscopy.

   RSK : 11.1 to 11.3

6. **Mass Spectrometer:**

   Basic mass spectrometer, types of mass spectrometers, components of a mass spectrometer.

   RSK: 10.1 to 10.3

7. **Raman Spectrometer:**

   The Raman effect, Raman spectrometer.

   RSK: 8.1 and 8.2

Text and Reference Books:

1. DPK : Optics and Atomic Physics. D. P. Khandelwal (Ed. 1989); Himalaya Publ. House.
2. RSK : Handbook of Analytical Instrumentation, R. S. Khandpur (Ed. 2000); Tata McGraw Hill.

3 A Text Book of Optics, Subramanayam, Brijlal and Avadhanulu (Ed. 2006); S.Chand & Co.

Veer Narmad South Gujarat University, Surat

S. Y. B. Sc.

Physics Practical

Paper – V

(For Industrial Chemistry Principal)

Group C:

1. To determine Cardinal points of a lens system by goniometer.

2. To estimate temperature of flame.

3. To determine temperature coefficient of resistance of a thermister using

P.O. Box. (Least square fitting method)

4. Viscosity of liquid by log decrement.

5. Mutual inductance by Ballistic galvanometer.

6. Comparison of capacities by method of mixture.

7. Resolving power of telescope.

8. Resolving power of grating.

9. Wave length of monochromatic light by cylindrical obstacle.

10. Two stage R.C. Coupled Amplifier.

11. Use of CRO (D)

(i) Frequency (ii) Phase difference.

12. Study of V.T.V.M. & its Uses (D).