

# SARDAR PATEL UNIVERSITY

## STRUCTURE OF S.Y.B.Sc.- MATHEMATICS

### SEMESTER- 4

<b>Course</b>	<b>Subject code</b>	<b>Subject Title</b>	<b>Credit</b>	<b>Hours</b>
Core Courses	US04CMTH01	Linear Algebra	03	03
	US04CMTH02	Differential Equations	03	03
	US04CMTH03	Mathematics Practical	03	06
	US04CPHY01	Electromagnetic Theory and Spectroscopy	03	03
	US04CPHY02	Solid State Physics	03	03
	US04CPHY03	Physics Practical	03	06
Elective courses	US04ESTA01	Operations Research	02	02
	US04ECSC03	Information Technology in Business	02	02
Foundation Courses	US04FENG01	Functional English	02	02
Total credit			<b>24</b>	<b>30</b>

**SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR**  
**SYLLABUS FOR B.Sc.(MATHEMATICS) SEMESTER - IV**  
**US04CMTH01 ( Linear Algebra )**  
**THREE HOURS PER WEEK (3 CREDIT)**  
**Effective from June 2012**  
**Marks:-100( 30 internal+70 external)**

**UNIT-1** . Vector spaces : Definition and examples , Properties of vector spaces , Subspaces Definition and Examples , Span of a set : Examples and Properties , Union and intersection of subspaces of a vector space .

**UNIT-2** . Linear dependence and independence vectors : Definition and Examples , Properties of LD and LI vectors , Collinear and coplanar vectors : Definition and Examples .

**UNIT-3** . Dimension and basis of a vector space : Definition , Examples and Applications , Linear Transformations : Definition and examples .

**UNIT-4** . Property of linear Transformation , Matrix associated with a linear map , Linear map associated with a Matrix and Examples . .

**Recommended text:**

V.Krishnamurthy , An introduction to Linear Algebra :  
Chapter 3 (3.1,3.2,3.3,3.5,3.6), Chapter 4 (4.1), Chapter 5 (5.1,5.2).

**Reference texts:**

- (1) P.B.Bhattachary,S.K.Jain,N.R.Nagpaul,First Course in Linear Algebra , Wiley - Eastan Ltd.
- (2) Dr.Gundadhar Paria , Linear Algebra,New Central Book Agency .
- (3) A Ramchandra Rao ,P.Bhima shankaram , Linear Algebra , Tata MacGraw-Hill Pub.

**SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR**  
**SYLLABUS FOR B.Sc.(MATHEMATICS) SEMESTER - IV**  
**US04CMTH02 ( Differential Equations)**  
**THREE HOURS PER WEEK (3 CREDIT)**  
**Effective from June 2012**  
**Marks:-100( 30 internal+70 external)**

**UNIT-1** . Surfaces and curves in three dimensions , Methods of solving  $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$  , Orthogonal trajectories of a system of curves on surface .

**UNIT-2** . Pfaffian forms and equations , Solution of Pfaffian differential equations in three variables , Partial differential equations , Origin of first order partial differential equations , Linear equations of the first order .

**UNIT-3** . Integral surfaces through a given curve , Surfaces orthogonal to a given system of surfaces , Non-linear partial differential equations of first order .

**UNIT-4** . Compatible systems of first order equations , Charpit's method , The origin of second order equations , Linear partial differential equations with constant coefficients , Equations with variable coefficients.

**Recommended texts:**

I.Sneddon, Elements of Partial Differential Equations, McGraw Hill Book Company, International Student Edition:

Chapter 1 (1.1,1.3,1.4,1.5(excluding Thm.6),1.6), Chapter 2 (2.1,2.2,2.4 (Statement only for Thm.3),2.5,2.6,2.7,2.9,2.10), Chapter 3 (3.1,3.4,3.5,3.9)

**Reference Books :**

- (1) M.D.Raisinghania, Ordinary and Partial differential equations.
- (2) T.Amarnath, An elementary course in partial differential equations.
- (3) B.S.Gawal, Higher Engineering Mathematics.
- (4) K.R.Kachot, Higher Engineering Mathematics.

**SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR**  
**B.Sc.(MATHEMATICS) SEMESTER - IV**  
**US04CMTH03 (Mathematics Practical )**  
**SIX HOURS PER WEEK (3 CREDIT)**  
**Effective from June 2011**  
**Marks:-100( 30 internal+70 external)**

- (1) Recognition of the properties of functions from their graphs.
- (2) Constructions with a ruler and compass only.
- (3) Verifications of geometric results.
- (4) Conics , Polyhedra,Cylinder ,Cone and verification of properties.
- (5) Model Making of Polyhedra and String Construction.
- (6) Solid surfaces and other models.

**Notes :**

- (1) Use of the standard texts books may be permitted at the time of Practical Examination.
- (2) The candidate shall have to produce at the time practical Examination the record of their prescribed Laboratory work, certified by the Head of the Department.

# SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar-388120

**B.Sc. (Semester - 4)**

**Subject: Physics**

**Course: US04CPHY01**

## **Electromagnetic Theory and Spectroscopy**

**(Three Credit Course –3 Hours per week)**

**(Effective from June-2012)**

### **UNIT - I Electrostatics**

**Electric field:** Brief introduction to Gradient, Divergence, Curl and Coordinate Systems, Coulomb's Law, The Electric field, Continuous charge distribution, **Divergence and curl of Electrostatic fields:** Field lines, Flux and Gauss's law, The Divergence of E, Application's of Gauss's law, The Curl of E, **Electric Potential:** Introduction to potential, Comments on potential, Poisson's equation and Laplace's equation, The potential of a localized charge distribution, **Work and Energy in Electrostatics:** The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Related Numericals

### **UNIT - II Magnetostatics**

**The Lorentz Force Law:** Magnetic fields, Magnetic forces, Currents, **The Biot-Savart law:** Steady currents, The Magnetic field of a steady current, **The Divergence and Curl of B:** Straight-Line currents, The Divergence and Curl of B, Applications of Ampere's law, Comparison of Magnetostatics and Electrostatics, **Magnetic Vector Potential:** The Vector potential, Summary; Magnetostatic boundary conditions, Multipole expansion of the vector potential, Related Numericals

### **UNIT - III Atomic Spectra**

Investigation of Spectra, Production of Spectra, Types of Spectra, Wave Number, The Spinning Electron, Space Quantization, Quantum Numbers and their Physical Interpretation, L-S Coupling, J-J Coupling, Experimental study of Zeeman Effect, Classical Interpretation of Normal Zeeman Effect, Anomalous Zeeman Effect, Stark Effect

### **UNIT - IV X-ray Spectra**

Production of X-rays, X-rays, Light and Electromagnetic Spectrum, Diffraction of X-Radiations, Bragg's law, Continuous X-ray spectrum, Characteristic Emission Spectrum, Characteristic absorption Spectrum, A Close Survey of Emission Spectrum, Explanation of Emission and Absorption Spectra, Comparison of Optical and X-ray Spectra, Moseley's Law, The Fluorescence yield and Auger Effect

### **Books Recommended:**

1. Introduction to Electrodynamics  
David J Griffiths, Prentice-Hall of India Private Ltd.
2. Electricity and Magnetism  
A S Mahajan and A A Rangwala  
Tata McGraw Hill Publishing Company Ltd
3. Elements of Electromagnetics  
Sadiku, Oxford University Press
4. Elements of Spectroscopy  
S L Gupta, V Kumar, R C Sharma  
Pragati Prakashan
5. Molecular structure and Spectroscopy  
G Aruldas, Prentice-Hall of India Private Limited

# **SARDAR PATEL UNIVERSITY**

Vallabh Vidyanagar-388120

**B.Sc. (Semester - 4)**

**Subject: Physics**

**Course: US04CPHY02**

**Solid State Physics**

**(Three Credit Course –3 Hours per week)**

**(Effective from June-2012)**

## **UNIT-I Basic Elements of Crystallography**

Introduction, Lattice points and space lattice, The basics and crystal structure, Unit Cell, Unit Cell versus Primitive Cell, Unit Cell and lattice parameters, Crystal types, Two dimensional crystal lattice, Seven crystal system, Symmetry Operations (Translational, Point, & Hybrid), Metallic crystal structures, Relation between the density of crystal materials and lattice constants, Directions planes and Miller Indices of crystal planes, Important features of Miller indices in a cubic crystal, Separation between lattice planes in cubic crystal

## **UNIT-II Atomic Cohesion, Crystal Binding, Atomic Size**

Introduction, Force between atoms, Cohesion of atoms and cohesive energy, Calculation of cohesive energy, Calculation of lattice energy of ionic crystals, Calculation of Madelung constant of ionic crystals, The Born–Haber cycle, Bonding in solids, Primary Bonds (Covalent, Metallic, Ionic and Mixed), Secondary bonds (van der Waals and Hydrogen Bond), Properties of primary and secondary bonds, Wave mechanical concept of atom, Atomic size, Ionic radii, Empirical ionic radii, variation of ionic radii, Covalent radii, Metallic radii, van der Waals radii

## **UNIT- III Thermal & Dielectric Properties of Solids**

Introduction, The specific heat of solid, The classical lattice heat capacity, The Einstein Model, The density of states, The Debye theory of heat capacity, Thermal conductivity of solids, Thermal conductivity due to electrons and phonons, Thermal resistance of solids, Dipole moment, Polarization, The electric field of a dipole, Local electric field at an atom, Dielectric constant and its measurement, Polarizability, The classical theory of electronic Polarizability, Dipolar Polarizability

## **UNIT-IV Structure of Polymers and its Applications**

Introduction, Hydrocarbon molecules, Polymer molecules, The chemistry of polymer molecules, Molecular weight, Molecular shape, Molecular structure, Molecular Configurations, Thermoplastic and thermosetting polymers, Copolymers, Mechanical Behavior of polymers (Stress-Strain behavior, Macroscopic deformation, Viscoelastic deformation, Fracture of polymers, Miscellaneous mechanical characteristics), Mechanisms of deformation for strengthening of polymers (deformation of semi-crystalline polymers, factors that influence the mechanical properties of semi-crystalline polymers, deformation of elastomers), Polymer Types (Plastics, Elastomers, Fibers)

### **Books Recommended:**

1. Solid State Physics  
M A Wahab, Narosa Publishing House.
2. Solid State Physics  
S O Pillai, , New Age International Publisher
3. Material Science and Engineering  
W D Callister Jr. Wiley India (P) Ltd.
4. Introduction to Solid State Physics  
C Kittel, (5<sup>th</sup> Edition) Wiley Eastern Ltd.
5. Elements of Solid State Physics  
J P Srivastava, Prentice-Hall of India

# SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar - 388 120

B.Sc. (Semester - 4)

**Subject: Physics (Practical)**

**Course No. US04CPHY03**

**(Three Credit Course –6 Hours per week)**

**(Effective from June-2012)**

## List of Practicals:

1. Characteristics of FET
2. Miller Indices using X-Ray diffraction pattern.
3. De-Broglie Relation using electron diffraction pattern.
4. Wave length of a monochromatic light ' $\lambda$ ' using Double Slit method.
5. Study of a Hartley Oscillator
6. Study of a Colpitts Oscillator
7. Thermal Conductivity (K) by Lee's method
8. Frequency Response of RC Coupled amplifier (with negative feedback).
9. Study of L-C-R Parallel Resonance
10. Wave length of a monochromatic light ' $\lambda$ ' using Lloyd's mirror
11. Study of a Thermocouple
12. Cauchy's Constants
13. Find the Stefan's Index
14. Numerical Integration
15. Propagation of errors in observation.

**Note:** To provide flexibility up to the maximum of 20% of total experiments can be replaced/ added to the list by the board of studies.

## Books Recommended:

1. Advanced Practical Physics for students  
B L Wosnop and H T Flint  
Methuen and Co. Ltd., London
2. B.Sc. Practical Physics  
C L Arora  
S.Chand & Co. Ltd., New Delhi
3. Advanced Practical Physics  
M S Chauhan and S P Singh  
Pragati Prakashan, Meerut
4. Advanced Practical Physics  
S L Gupta and V Kumar  
Pragati Prakashan, Meerut

**SARDAR PATEL UNIVERSITY  
FOURTH SEMESTER  
(EFFECTIVE FROM JUNE, 2011)  
SUBJECT: STATISTICS  
COURSE CODE: US04ESTA01  
(OPERATION RESEARCH-II)**

**Course credit: 2**

**No. of lectures per week: 2**

**All units carry equal Weightage**

**Weightage: Internal – 30%, External – 70%**

**Unit-I Assignment Problem**

- Introduction
- Mathematical formulation of Assignment problem
- Hungarian Assignment method
- Unbalanced Assignment Problem
- Maximal Assignment Problem

**Unit-II Elements of Game theory**

- Introduction
- Two person zero sum game
- Games with saddle point:
- Maximin-Minimax principle
- Strictly determinable game
- Fair Game

**Unit-III Game theory**

- Games without saddle point:
- Solution of  $2 \times 2$  game (Without proof)
- Graphical method of solving  $m \times 2$  and  $2 \times n$  games
- Dominance property

**Unit-IV Network analysis**

- Network scheduling
  - Introduction
  - Network & Basic components
  - Rules of network construction
  - CPM Technique (Critical path in Network Analysis)
    - Float of an activity and even
    - Event Float
    - Activity float
      - (i) Total float
      - (ii) Free float
      - (iii) Independent float
    - Determination of the critical path
    - Determination of float

**References:**

- (i) Operations Research by S.D.Sharma
- (ii) Operations Research by J.K.Sharma
- (iii) Operation Research by Hamdy A.Taha

**Course : US04ECS03**  
**( Information Technology in Business)**

**Credits : 2**  
**Lectures per week : 2**  
**University examination duration : 2 Hours**  
**All units carry equal weightage.**

**Unit 1. Introduction to Information Systems - I**

- Categories of information, the data pyramid
- Information systems and technologies
- Importance of information systems in businesses
- Information system activities – input, processing, output, storage, control of system performance

**Unit 2. Introduction to Information Systems - II**

- Components of an information system
- Information system resources – people, hardware, software, data, network
- Gaining strategic advantage through IT
- Managerial Challenges of IT

**Unit 3. Functional Business Systems**

- An introduction to information systems for manufacturing, marketing, accounting, human resources management, financial management, inventory management, etc.

**Unit 4. Introduction to Enterprise Applications**

- An introduction to Enterprise Resource Planning, Customer Relationship Management, Supply Chain Management, E-commerce systems

**MAIN REFERENCE BOOKS :**

1. O'Brien J. : Management Information Systems, Tata McGraw-Hill, 2004
2. Jessup L., Valacich J. : Information Systems Today – Why IS Matters, Pearson Education, 2006

Sardar Patel University  
Syllabus of B.Sc. (Fourth Semester)  
Subject: Functional English  
Course code: US04FENG01  
2 credits(Practical)  
Hours per week (2 hours/batch)  
Internals 30 marks+ externals 70marks

<b><u>Unit 1 Listening for Specific Purposes</u></b>		<b>Marks</b>
1	Listening for information (Fill in the blanks) (46 to 60)	<b>10</b>
2	Listening for Gist of the audio/video Writing the gist	<b>03</b>
3	Identify the language functions	<b>02</b>

**Total= 15**

**Unit 2 Writing Skills**

1	Letters for social occasions (Condolence, Invitations, encouragement and best wishes)	<b>07</b>
2	Words used in Newspaper Headlines (Match the meaning with words given in the headlines)	<b>04</b>
3	Notice Writing	<b>05</b>
4	Collocations	<b>04</b>

**Total= 20**

**Unit 3 Oral Skills**

1	Mock Interviews(Introduction, talking about their field, interest and body language)	<b>15</b>
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**Total= 15**

**15+05 journal= 20**

**Unit 4 Grammar and Vocabulary**

1	Prepositions of place, time and direction (fill in the blank)	<b>04</b>
2	Punctuation ( In a paragraph)	<b>04</b>
3	Question tags (fill in the blank)	<b>03</b>
4	Articles and plural forms (fill in the blank)	<b>04</b>

**Total= 15**

## **Topics to be covered in the journal:**

### **All the topics from Unit One**

- 1** Listening for information  
(Fill in the blanks)
- 2** Listening for Gist of the audio/video  
Writing the gist
- 3** Identify the language functions
- 4** Letters for social occasions (Condolence, Making Arrangements, Invitations, Encouragement and Best Wishes)
- 5** Words used in Newspaper Headlines  
(Match the meaning with words given in the headlines)
- 6** Notice Writing  
Collocations
- 7** Prepositions of place, time and direction  
(fill in the blanks)
- 8** Punctuation (In a paragraph)
- 9** Question tags (Fill in the blanks)
- 10** Articles and plural forms  
(Fill in the blanks)