

FACULTY OF SCIENCES
SYLLABUS
FOR
VALUE ADDED COURSES
(FOR B.Sc. / M.Sc. STUDENTS)

Examinations: 2022-2023



Department of Physics

Khalsa College, Amritsar

(An Autonomous College)

Note: (a) Copy rights are reserved. Nobody is allowed to print it in any form.
(b) Subject to change in the syllabi at any time.
(c) Please visit the College website time to time.

FUNDAMENTALS OF CRO (CATHODE RAY OSCILLOSCOPE)

VAFC-1

Total Hours: 30

Maximum Marks: 50

Pass Marks: 35 %

Instructions: Question paper will consist of 25 Multiple Choice Questions (MCQs) of 2 marks each covering the whole syllabus. The candidate will have to attempt all the questions.

Course Objective: The aim of this course is to make the students aware about the basics of CRO & Its uses. The students will learn about the specifications and panel controls of CRO, working of CRO and its applications in measuring voltage, frequency and Lissajous patterns.

Course Content:

Unit-I

-Introduction of Cathode Ray Oscilloscope (CRO), Constitution of CRO, Construction and working of Cathode Ray Tube (CRT), Electron Gun, Focusing, Deflection System, Deflection Sensitivity, Fluorescent Screen.

-CRT Phosphor Materials and Characteristics, Block diagram description of a basic CRO, Time Base Generators or Sweep voltage.

-Applications of CRO: Measurement of Voltage, Current & Frequency, Lissajous patterns.

Unit-II

-Front Panel Controls of CRO, Specifications of CRO and their explanation using working Model.

-Waveform Monitoring using CRO.

-Measurement of Amplitude, Voltage, Frequency and Period of an AC Supply, Voltage of DC supply.

-Measurement of Deflection Sensitivity (X & Y).

-Comparison of the frequencies of oscillations produced by two audio oscillators using the Lissajous figures on CRO.

Books Prescribed:

1. Basics Electronics and Linear Circuits by NN Bhargava, DC Kulshreshtha and SC Gupta. Technical Teachers Training Institute Chandigarh. Tata McGraw-Hill Publications.
2. Practical Physics by CL Arora. S. Chand Publications.
3. Electrical and Electronic measurements and Instrumentation by A.K.Sawhney. Dhanpat Rai & Sons Publications.
4. Electrical Circuits and Basic semiconductor electronics by JP Agarwal and Amit Agarwal. Pragati Publications.

Course Outcomes:

Sr. No.	On completing the course, the students will be able to:
CO1	Learn about the different specifications of CRO.
CO2	Monitor the waveform using CRO.
CO3	Measure voltage, frequency and phase on a variety of displayed waveforms.
CO4	Learn about CRT Phosphor Materials and Characteristics.

VALUE ADDED COURSE FOR B.Sc. STUDENTS

DATA ANALYSIS USING EXCEL SPREADSHEET

VADA-2

Total Hours: 30

Maximum Marks: 50

Pass Marks: 35%

Instructions: Question paper will consist of 25 Multiple Choice Questions (MCQs) of 2 marks each covering the whole syllabus. The candidate will have to attempt all the questions.

Course Objectives:

The main objective of this course is to make students familiar with the Microsoft excel and its applications in different areas. It further aims to make them able to plot different types of graphs or charts with the help of excel.

Course Content:

UNIT-I

Introduction to Microsoft Excel- Worksheet overview, History of excel, versions, importance, features and organization of worksheet. Application areas of spreadsheet, row, column and cell. Adding, resizing, copying and pasting of cells. Active cell, cell pointer and address, drag and drop, freeze panes, basic shortcut keys, undo and redo.

UNIT-II

Data analysis- Entering data, formulas, statistical functions, mathematical functions, converting formulas to values, create a chart or graph, different types of chart, Display a 3-D column chart, Chart toolbar, printing the graph, Enhancing the charts, gridlines, formatting text and numbers, color and patterns, modifying and deleting.

Books Prescribed:

1. Windows based computer courses: G. Singh and R. Singh - Kalyani publishers.
2. Introduction to computers: Peter Norton- Tata Mcgraw Hill.
3. Computer Fundamentals: P.K. Sinha and Priti Sinha- BPB publications.

Course Outcomes

Sr. No.	On completing the course, the students will be able to:
CO1	Know about the history and importance Microsoft excel.
CO2	Understand about the basics involved in spreadsheet.
CO3	Solve mathematical and statistical problems with excel.
CO4	Plot graphs and charts with the help of Microsoft excel.
CO5	Enhance the charts with toolbar and shortcut keys.

VALUE ADDED COURSE FOR B.Sc. STUDENTS

DIGITAL STORAGE OSCILLOSCOPE

VADS-3

Total Hours: 30

Maximum Marks: 50

Pass Marks: 35%

Instructions: Question paper will consist of 25 Multiple Choice Questions (MCQs) of 2 marks each covering the whole syllabus. The candidate will have to attempt all the questions.

Course Objectives: The objective of the course is to acquaint the students with the modern version of oscilloscopes and their applications in studying experiments in Physics using advanced features.

Course Content:

Unit I

Brief introduction to Oscilloscopes: History, basic construction, parts and functions of an oscilloscope, Types of Oscilloscopes: Analog and Digital, Advantages of Digital oscilloscopes over Analog oscilloscopes.

Unit II

Working principle of a Digital storage oscilloscope (DSO), Front panel controls, Specifications and modes of working, Applications of DSO in Physics experiments related to charging and discharging of capacitor and analysis of induced e.m.f

Books Prescribed:

1. Digital storage Oscilloscopes by Ian Hickman.
2. Practical Physics by C.L Arora. S. Chand Publications.
3. Electronic instrumentation by H.S Kalsi.
4. Measurements and instrumentation by A.K Sawhney.

Course Outcomes

Sr. No.	On completing the course, the students will be able to:
CO1	Understand the working of an Digital storage oscilloscope.
CO2	Understand advanced settings and functions of a DSO.
CO3	Gain insight into the fact that how and why digitized versions of oscilloscopes are more efficient and advantageous than analog oscilloscopes
CO4	Learn about the various controls and advanced features of DSO which can be helpful in analysing Physics experiments in a better way.

VALUE ADDED COURSE FOR B.Sc. STUDENTS

SPREADSHEET SIMULATIONS IN PHYSICS VASM-4

Total Hours: 30

Maximum Marks: 50

Pass Marks: 35%

Instructions: Question paper will consist of 25 Multiple Choice Questions (MCQs) of 2 marks each covering the whole syllabus. The candidate will have to attempt all the questions.

Course Objective: The aim of the course is to train the students about the utilization of excel spreadsheet for simulating a physical problem. The students will learn the technique to handle the given problems for data generation and analysis by developing a program in spreadsheet.

Course Content:

Unit-I

Getting started with excel, formatting of numbers displayed on the spreadsheet, cell reference, naming the cells, putting numbers and formula in cells, format for a cell or a group of cells, Auto filling of data, sheet reference, beginning of data analysis project for simulation a given problem, assigning the fixed and variables in cells, data generation, data analysis using graphs, adding the best fit to the analysis result.

Unit-II

Spreadsheet based simulations for obtaining lissajous figures.

Diffraction of waves for single slit double slit and N slits

Charged particle trajectory in the electric, magnetic and in an electromagnetic fields.

Books Prescribed:

1. Modelling Physics with Microsoft Excel Bernard V Liengme, Morgan & Claypool Publishers (2014)
2. Excel for Scientists and Engineers Numerical Methods E. Joseph Billo A John Wiley & Sons, Inc., Publication (2011)
3. Windows Based Computer Courses Gurvinder Singh & Rachpal Singh, Kalyani Pub.

Course Outcomes:

Sr. No.	On completing the course, the students will be able to:
CO1	Attain core competency in the subjects of simulations in excel spreadsheet.
CO2	Develop skills to develop program for other problems.
CO3	Ability to implement and perform modelling using excel commands for simulating physics concepts
CO4	Trained to carefully listen, read and develop model for generating the experimental data/research papers and express it through technical writing as well as orally in a concise manner.
CO5	The course is designed in such a manner that it enables the students to develop critical thinking ability required to build a model for simulating the physics topics.

VALUE ADDED COURSE FOR M.Sc. STUDENTS

THIN FILM DEPOSITION AND UV- VISIBLE CHARACTERIZATION

VATF-5

Total Hours: 30

Maximum Marks: 50

Pass Marks: 35%

Instructions: Question paper will consist of 25 Multiple Choice Questions (MCQs) of 2 marks each covering the whole syllabus. The candidate will have to attempt all the questions.

Course Objectives: The objective of the course is to introduce the students to Thin Film Deposition and UV-Visible Characterisation technique with a view to motivate the students for research.

Course Content:

Unit-I

Introduction to solution based thin film preparation techniques with emphasis on chemical vapor deposition. Experimental procedure for deposition of metal oxide thin films by Ultrasonic Spray Pyrolysis: Preparation of precursor solution, selection of substrate and setting of deposition parameters. Advantages of Ultrasonic spray pyrolysis technique over conventional spray pyrolysis. Sensing applications of metal oxide thin films.

Unit-II

UV Visible Spectroscopy: Definition and Principle, Beer-Lambert law, Absorption and Intensity Shift, Instrumentation of UV- visible Spectroscopy, Sources of UV light, Applications of UV Visible spectroscopy.

Books Prescribed:

1. Thin film Phenomenon by K.L. Chopra, Mc Graw Hill 1969
2. Science and technology of chemiresistor gas sensors DK Aswal, SK Gupta Nova Publishers
3. Basic Principles of UV- Visible and Infrared Spectroscopy by K.N. Puri, Nabh Prakashan.
4. Text Book for UV-Visible Spectroscopy by Dr. Arunadevi Shantappa Birajdar (2019).
5. Glasses for Photonics by Varshneya, Academic Press, Inc. San Diego, CA.

Course Outcomes:

Sr. No.	On completing the course, the students will be able to:
CO1	Understand the process of thin film deposition through solution based route.
CO2	Understand the effect of deposition parameters on the properties of the prepared thin films
CO3	Learn the basics of UV- Visible spectroscopy.
CO4	Learn about how to apply the UV-Visible spectroscopy technique for different materials.