"Education for knowledge, science and culture" –
Shikshanmaharshi Dr. Bapuji Salunkhe
Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANANDCOLLEGE, KOLHAPUR (AUTONOMOUS)
Department of B.Sc. Computer Science Entire
Course Structure under Three- Years UG Program
Department/Subject Specific Core or Major (DSC)

1. **TITLE: Three Years UG degree in B.Sc. computer science entire**
2. **YEAROF IMPLEMENTATION:** academic year 2023-24 onwards
3. **EXAMINATIONPATTERN:** semester wise for Theory and Practicals
4. **STRUCTURE OF COURSE:**

B.Sc. Computer Science entire-I Semester-I & II

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week TH	Teaching Scheme Hours/week PR	Examination Scheme and Marks ESE	Examination Scheme and Marks CIE	Examination Scheme and Marks PR	Examination Scheme and Marks Marks	Course Credits
			Semester-I							
1	DSC-I	DSC06COM11	Introduction to computers-I	2	-	40	10	-	50	2
2	DSC-II	DSC06COM12	Programming in C-I	2	-	40	10	-	50	2
3	MIN-I	MIN06ELE11	Analog Electronics	2	-	40	10	-	50	2
4	MIN-II	MIN06ELE12	DigitalElectronics-I	2	-	40	10	-	50	2
5	OEC-I	OEC06MAT11	Foundational maths	2	-	40	10	-	50	2
6	OEC-II	OEC06STA11	Descriptive Statistics-I	2	-	40	10	-	50	2
7	AEC-I	AEC06ENG11	Business Communication-I	2	-	40	10	-	50	2
8	IKS-I	IKS06GEC11	Indian knowledge System	2	-	25	-	-	25	2
9	DSC-PR-I	DSC06COM29	DSCComputer Lab-1	-	4	-	-	25	25	2
10	MIN-PR-I	MIN06ELE29	MIN Electronics Lab-1	-	4	-	-	25	25	2
11	OEC-PR-I	OEC06MAT29	OEC Maths Lab-1	-	2	-	-	25	25	1
12	OEC-PR-I	OEC06STA29	OEC StatisticsLab-1	-	2	-	-	25	25	1
	Total (Semester-I)			16	12	305	70	100	475	22

				Semester-II							
1	DSC-III	DSC06COM21	Introduction to computers-II	2	-	40	10	-		50	2
2	DSC-IV	DSC06COM22	Programming in C- II	2	-	40	10	-		50	2
3	MIN-III	MIN06ELE21	Instrumentation	2	-	40	10	-		50	2
4	MIN-IV	MIN06ELE22	DigitalElectronics-II	2	-	40	10	-		50	2
5	OEC-III	OEC06MAT21	Operational Research	2	-	40	10	-		50	2
6	OEC-IV	OEC06STA21	DescriptiveStatistics-II	2	-	40	10	-		50	2
7	SEC-II	SEC06STA21	Introduction to Excel		4			25		25	2
8	AEC-II	AEC06ENG21	Business Communication-II	2		40	10			50	2
9	DSC-PR-I	DSC06COM29	DSCComputer Lab-1	-	4	-	-	25		25	2
10	MIN-PR-I	MIN06ELE29	MIN Electronics Lab-1	-	4	-	-	25		25	2
11	OEC-PR-I	OEC06MAT29	OEC Maths Lab-1	-	2	-	-	25		25	1
12	OEC-PR-I	OEC06STA29	OEC StatisticsLab-1	-	2	-	-	25		25	1
	Total (Semester-II)			14	16	280	70	125		475	22
	Cumulative Total (1st Year)			30	28	585	140	225		950	44

B. Sc. Part – I (Computer science Entire)

NEP Syllabus with effect from June, 2023

Semester: I

Major

Paper-I: Introduction to computers -I

Theory: 30 Hours (30Lectures) Credits -02

Course Outcomes:

After completion of this course students will be able to:

1. Learn fundamental concepts of computers.
2. Learn the principles of office automation.
3. Learn Input, Output Devices and Concept of Memory
4. Teach basic principles of Operating system.

Unit –1: Introduction to Computer and Basic Organization (08)

- Introduction, History. Characteristics & features of Computers.
- Components of Computers.
- Organization of Computer.
- Classification of Computers
- Computer Languages-Types of Programming Languages, Machine Languages, Assembly Languages, High Level Languages
- Assembler, Linker, Loader, Interpreter & Compiler.

Unit – 2: Input, Output Devices and Concept of Memory (07)

- Input Devices :Touch screen, OMR, OCR, Light pen, Scanners
- Output Devices :Digitizers, Plotters, LCD, Plasma Display, Printers and its types
- Types of Memory (Primary And Secondary)-RAM, ROM, PROM, EPROM
- Secondary Storage Devices (FD, CD, HD, Pendrive, DVD, Tape Drive,USB)

Unit – 3: Operating System concepts (05)

- Introduction of Operating System- Why Operating System, History of operating system, Functions of Operating System
- Types of Operating System
- Introduction to Computer Virus, how does it spread? Symptoms of it, Types of Virus, Antivirus, Prevention from Virus.

Unit – 4: MS Word MS PowerPoint (10)

- MS Word -Word Processing, features of word processing, menus and commands ,toolbars and buttons, word formatting toolbar , creating document, saving a document, printing a document, Paragraph setting, mail merge, graphs ,pictures, image, working with tables.
- MS Power point - Introduction to PowerPoint, Creating a Presentation, PowerPoint views, Slide show, Formatting slides, Slide transition & adding special effects, Inserting pictures, sound, chart.

References

1. Fundamentals of Computers By V. Rajaraman

2. Computers and Common Sense By R. Hunt and Shelly Y.

3. Fundamentals of Computers By P. K. Sinha

4. Andrew S. Tanenbaum, "Modern Operating Systems", 2ndEdition, PHI private Limited, New Delhi,2008.

5. Fundamentals of Computers by Reema Thareja from Oxford University Press

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Paper-II -Programming in C-I
Theory: 30 Hours (30Lectures) Credits -02
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Course Outcomes:
After completion of this course students will :
1. Have the knowledge of programming concepts like program, algorithms, flowcharts and pseudocode.
2. Have the basic know of C programming language like variable, comstnts, data type and operators.
3. Have the knowledge of input output statements and control structures used in C.
4. Develop skills of writing simple programs using C.

Unit 1: Programming Concepts   (07)
Program and programming, Programming languages, Algorithm: Definition, Examples, Characteristics of an algorithm, Notation of Algorithm, Pseudo code conventions, Flowcharts-Definition, Symbol, features.

Unit 2: Introduction to C   (05)
History of 'C', Structure of 'C' program, Program execution phases, Character set and keywords, Constant and its type, Variable and its Data types in 'C', OperatorsArithmetic, logical, relational, bitwise, increment, decrement ,conditional, operator precedence Programming examples

Unit 3: Input-Output Statements   (08)

Character input-output - getch(), getche(),getchar(),putchar(), String input-output - gets(), puts() , Formatted input-output - printf(), scanf()

Unit 4: Control Structures (10)

Conditional Control Statements –if –if-else –nested if-else –else-if ladder Multiple Branching Control Statement –switch-case Loop Control Statements –while –do-while –for –Nested Loops Jump Control statements –break –continue –goto –ex

Minor
Paper-I: ANALOG ELECTRONICS
Theory: 30 Hours (30Lectures) Credits -02

Course Outcomes:
After completion of this course students will be able to:
1. Demonstrate and explain electrical components and determine the value of resistance of resistor, Inductance of inductor and capacitance of capacitor using color code method.
2. Acquire the knowledge about the characteristics and working principles of PN junction diode, Zener diode, photo diode, LED and different diode applications.
3. Analyze output in different operating modes of Bipolar Junction Transistor and Demonstrate the Operating principle and output characteristics of Bipolar Junction Transistor
4. Design biasing circuits for BJT and study different coupling methods used in multistage amplifiers.

UNIT 1: Basic Circuit Elements (10)

Definition of active and passive elements.
Resistors: Classification, color code, specifications of resistors. Construction of Carbon composition, carbon film and wire wound resistors. Potentiometer.
Capacitors: Definition, Capacitance, capacitive reactance (XC), Classification of capacitors, Construction of electrolyte capacitor.
Inductors: - Definition, symbol, Inductance, Inductive reactance (XL), Types of Inductors: - Air core, Iron core and ferrite core inductors.
Transformers:- Principle and construction of transformer, Types of Transformer: - Step-up, step-down transformer.
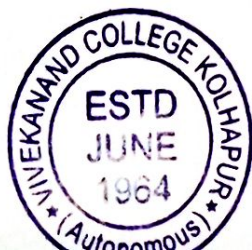*Switches*: Explanation using Symbols
Relay: - Principle, construction and working of electromagnetic relay.

UNIT 2: Semiconductor Diodes (04)

Formation of P-N junction, Depletion layer, Working and I-V characteristics of PN junction

diode. Diode applications, Zener diode (Construction and working), Photodiode and LED, Current limiting resister for LED, Applications- Optocoupler, 7-segment display.

(08)

UNIT 3: Bipolar Junction Transistor (BJT)

Structure and working of bipolar junction transistor: CB, CC, CE configurations, CE mode characteristics, Relation between α and β, DC load line and Q point, potential divider Biasing, Concept of transistor as an amplifier and transistor as a switch.

(08)

UNIT 4: Amplifiers:

Need of transistor Biasing, Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Class A, B, AB and C Amplifiers (Comparative Study on the basis of Q point), Single stage CE amplifier: Current gain, Voltage gain, Power gain, **Cascaded Amplifiers**: Two stage RC, LC, TC and DC Coupled Amplifiers and their Frequency Responses.

Paper-II: DIGITAL ELECTRONICS - I
Theory: 30 Hours (30Lectures) Credits -02

Course Outcomes:
After completion of this course students will be able to:

1. Understanding the basics of Digital Electronics and different number systems and conversion between them.
2. Design and construction of the basic and universal logic gates and Studying the Boolean algebra and Simplification of Boolean expression using different methods.
3. Understand, analyze and design various combinational circuits.
4. Understand, analyze and design various sequential circuits.

Unit 1: Number System, Binary Codes and Binary Arithmetic   (08)
Different types of number systems (Decimal, Binary, Octal, Hexadecimal Number system), Inter conversion from one number system to another. Binary Codes (BCD code, ASCII code). Concept of Parity (Odd, Even), 1's complement and 2's complement of binary numbers, Binary arithmetic: addition, subtraction (using 1's complement and 2's complement), Signed and unsigned numbers.

Unit 2: Logic Gates and Boolean Algebra   (08)
Logic gates: AND, OR, NOT, NOR, NAND, EX-OR (Definition, Symbol, Expression and Truth Table), Universal gates (NAND and NOR).
Boolean algebra: Rules and laws of Boolean algebra, De-Morgan's Theorems, Simplifications of logic Expressions using Boolean algebra.

Unit 3: Combinational Circuits (06)

Concept of Combinational Circuits, Half adder, Full adder, half subtractor, Full Subtractor, 4-bit adder/subtractor, Multiplexer, De-multiplexer, Encoder (Decimal to BCD), Decoder : BCD to 7 segment decoder.

Unit 4: Sequential Circuits (08)

Concept of sequential circuits, *Flip-flops*: RS, Clocked RS, D, JK, Master Slave JK, T-Flip-flop, *Counters*- Asynchronous (3 – bit ripple) Synchronous (3 – bit) Ring Counter, Johnson counter (Truth tables and timing diagrams).

Open Elective
Paper-I: Foundational mathematic
Theory: 30 Hours (30 Lectures) Credits -02

Course Outcomes:
After completion of this course students will be able to:
1. Construct simple mathematical proofs and possess the ability to verify them.
2. Learn about matrices and solution of system of linear equations.
3. Have substantial experience to comprehend formal logic arguments .
4. Prove results involving divisibility and greatest common divisors .

Unit 1: Set and Relations [05]

- Basic definition and types of set
- Functions and types of function
- Relations and types of relation
- Equivalence class, Partition of a set
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Unit 2: Matrices and linear equations [11]

- Matrix and types of matrix
- Matrix Transformations
- Linear system
- Solution of linear system: Gaussian Elimination method and Gauss-Jordan method .
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Unit 3: Logic [10]

- Statement and types of statements
- Logical connectives and truth value and Construction of truth table .
- Statement pattern : Tautology , contingency and Contradiction.
- Logical equivalence
- laws of logic with examples.

Unit 4: Number theory

- Introduction
- Divisibility : Division algorithm (Statement only)
- Greatest Common Divisor (g.c.d.) and Least Common Multiple (l.c.m)
- Euclidean algorithm (Statement only) with examples .
- Fermat's theorem (Statement only), examples .

Recommended Books:

1. Algebra – Nirali publication .

2. Linear Algebra – Schaum Series .

3. Elements for Discrete mathematics – Nirali publications .

Reference Books:

1. Discrete mathematics – Vision publications and Olympia Nicodemi .

2. Algebra by Naik and Patil , Phadake Prakashan.

3. Elementary Linear Algebra with applications , Howard Anton ,Chris Rorres

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Open Elective
Semester -I STATISTICS
Descriptive statistics-I
Theory: 30 Hours (30 Lectures) Credits -02

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Course out come:
CO1. Demonstrate understanding of descriptive statistics by practical application
of quantitative reasoning and data visualization.
CO 2. Calculate and interpret the various descriptive measures for centrality and
dispersion
CO 3. Enumerate various measures of dispersion
CO 4. To compute correlation coefficient and its interpretation,
compute regression coefficients and regression lines.

Unit-1: Introduction   [8]

- Definition and concept Statistics, Population and Sample: Concept of statistical population with illustrations, concept of sample with illustrations.
- Methods of sampling: Simple Random Sampling and Stratified Random sampling (description only).

- Data Condensation: Raw data, Attributes and variables, discrete and continuous variables, classification and construction frequency distribution.
- Graphical Representation: Histogram, Frequency polygon, Frequency curve, Ogive curves and their uses.

Unit-2: Measure of Central Tendency [7]

- Concept of central tendency, Criteria for good measures of central tendency.
- Arithmetic mean: Definition, computation for ungrouped and grouped data, Combined mean, weighted mean, merits and demerits.
- Median: Definition, computation for ungrouped and grouped data, Graphical method, merits and demerits.
- Mode: Definition, computation for ungrouped and grouped data, graphical Method, merits and demerits.
- Quartiles: Definition, computation for ungrouped and grouped data graphical method.

Unit-3: Measures of dispersion [7]

- Concept of dispersion and measures of dispersion, absolute and relative measures of dispersion.

- Range and Quartile Deviation: definition for ungrouped and grouped data, and their coefficients, merits and demerits.

- Mean Deviation: Definition for ungrouped and grouped data, minimal property (statement only).

- Standard deviation and Variance: definition for ungrouped and grouped data, coefficient of variation, combined variance and s. d. for two groups, merits and demerits.

Unit-4: Correlation (for ungrouped data) [8]

- Concept of bivariate data, scatter diagram. Concept of correlation, positive correlation, negative correlation, cause and effect relation.
- Karl Pearson's coefficient of correlation, properties of correlation coefficient, interpretation of correlation coefficient.
- Spearman's Rank Correlation coefficient (formula with and without ties).

Regression (for ungrouped data):

- Concept of regression. Derivation of lines of regression by method of least squares.
- Regression coefficients and their significance. Properties of regression coefficients.
- Point of intersection and acute angle between regression lines (without proof).

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VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR
B. Sc. Part – I (Computer science Entire)
NEP Syllabus with effect from June, 2023
Semester: II
Major
Paper- I: Introduction to computers -II
Theory: 30 Hours (30Lectures) Credits -02

Course Outcomes:
1. After completion of this course students will be able to:
2. Define the basics in Ms Access.
3. Visualize the basic concept of HTML.
4. Recognize the elements of HTML.
5. Develop the concept of web publishing

Unit– 1: Introduction to Database   (05)
- Introduction to DBMS
- RDBMS basic concepts- RDBMS Terminologies,
- DBMS Vs RDBMS with examples
- Keys –Primary key & Foreign key

Unit– 2: MS –Access   (10)
- Working With Ms-Access - Tables, Queries, Forms, Reports, and Macros. Introduction to MsAccess, Designing Database, Crating Database using Wizard,
- Working with Table-Field types – Auto number, Date/Time, Number, Text, Yes/No, Hyperlink.
- Creating Tables using Design View and Using wizard, Editing Table, Editing Records. Query and Form Designing

Unit – 3: Introduction to HTML   (05)
- HTML Documents
- Basic structure of an HTML document
- Creating an HTML document
- Marquee Tags

- Heading-Paragraphs
- Line Breaks

Unit –4: Images, Tables Frames, Image Maps, Forms in HTML (10)

- Introduction to elements of HTML
- Working with Text
- Working with Lists, Tables and Frames
- Working with Hyperlinks, Images and Multimedia
- Working with Forms and controls.

References

1. The complete reference HTML & CSS by T.A. Powell (TMH Publication)
2. HTML, DHTML, JavaScript, Perl CGI by IVAN Bayroos (BPB Publication)
3. HTML 5 Step by Step, Faith Wempen, Prentice Hall of India Private Limited, New Delhi
4. Beginning HTML, XHTML, CSS, and JavaScript, John Duckett, Wiley India
5. Microsoft Office Access 2007: The Complete Reference (Complete Reference Series) 1st Edition, by Virginia Andersen (Author), McGraw Hill;
6. Access in easy steps Illustrated using Access 2019 Mike McGrath

Practical Programming List

1) Demonstration of peripherals

2) Linking of various peripherals

3) Operation of all keys of keyboard

4) DOS – external and internal commands, batch files commands

5) Windows Operating System –Windows explorer, program manager, control panel, print Manager, Creating folders, files, icons, shortcuts

6) MS – WORD – Creating new documents, typing, deleting, selecting text, undo, Redo, Formatting text – auto format, formatting characters, drop caps, Paragraphs, line spacing, Margins, page setup, headers and footers Writer's tools – spelling checker, auto format, auto Correct, find and replace Mail merge – Data source, Main document, creating mail merge Document.

7) MS ACCESS - Creating data bases, writing Queries, design forms and reports.

8) MS PowerPoint – Creating Presentation using various features.

9) Create a power point presentation to explain various aspects of your college using Auto play.

10) Create a power point presentation to explain the sales performance of a company over a period five years. Include slides covering the profile of the company, year wise sales and graph with gridlines, legends and titles for axe. Use Clip Art and animation features.

11) Create a power point presentation from template.

12) Prepare a power point presentation using Auto Wizard and see its various views.

13) Prepare a power point presentation with audio and video effect.

Guidelines Follow standard coding method

- Write Algorithm and draw flow chart neatly
- The output of the program should be neatly formatted
- Practice all the programs in the lab
- Sample Program list

14). Write HTML code to develop a web page for giving details of your name, age, address. It contains the different background and foreground color, with different attribute of Font tags like italic, bold, underline etc. and gives suitable heading style.

15). Write HTML code to create a WebPages that contains an Image at its left hand side of the page when user clicks on the image; it should open another web page that displays the details of that image.

16). Create a web Page Practicing Hyper linking of webpages, ALINK, VLINK etc.

17). Create a web page, showing an ordered list of name of your five friends and unordered list of any five your hobbies.

18) Create a HTML document containing a nested list showing the content page of any book.

19) Create a web page which should divide a page into two equal frames & 3 Frames

20) Design a form using all input types

21) Working with Background, Text and Font properties.

22) MS-ACCESS Create a table for storing marks of 10 students. The fields of the table are given below: Reg. No., Name, Mark1, and Mark2, Mark3, Test average (Best Two /2), assignment seminar and total marks (test average + alignment + seminar). The fields Mark1, Mark2, Mark3 should not allow the user to enter a mark greater than 25 and should display proper message in such case. Similar constraint for the field Assignment" is 5 marks and for the field „seminar", it is 10 marks.

23) Create a table showing names of authors of at least 10 different books, title of books, the prices of these books, name of publishers and year of publication.

24) Create a form to enter the data directly into this form. The fields required are: Basic Pay, DA, HRA, Gross salary, PF, Income tax and Net salary.

25) Create a report that displays the customer name, address, phone number, Item code, product quantity of the customers whose orders have been pending for over a month

Paper-II: Programming in C-II
Theory: 30 Hours (30Lectures) Credits -02

Course Outcomes:

After completion of this course students will be able to:
1. Develop logic for problem solving.
2. Teach basic principles of programming.
3. Develop skills for writing programs using 'C'.
4. To implement real worlds problems using programming language.

Unit 1: Function   [07]

What is function? Advantages of using functions, Function Prototype –Defining a function, Calling a function ,Return statement ,Types of functions ,Recursion, Local and global variables Programming Examples

Unit 2: Arrays and strings   [06]

Array –One dimensional arrays –Declaration of 1D arrays –Initialization of 1D arrays Accessing element of 1D arrays –Reading and displaying elements Two dimensional arrays – Declaration of 2D arrays –Initialization of 2D arrays, Accessing element of 2D arrays –Reading and displaying elements Initializing strings,Reading string, string handling functions (strcpy(), strcmp(), strcat(), strlen(), strrev()), Programming Examples

Unit 3: Pointer, dynamic memory allocation   [08]

Def of Pointer, Declaration of Pointer Variables, Assigning Address to Pointer Variables, De-referencing Pointer Variables, Pointer Arithmetic –Pointer comparisons –De-reference and increment pointer –Null pointer , Parameter Passing Techniques – call by value, call by address, malloc() –calloc() –realloc() . –free () Programming Examples

Unit 4: Structure   [09]

Why is structure used? What is structure? Advantages of structures, Defining a Structure , Declaration of Structure Variables , Initialization of Structure Variables , Accessing Structure Members ,Storage of Structures in Memory ,Size of Structures, Reading and Displaying Structure Variables , Assignment of Structure Variables , Pointers to structures, Array of

structures , Arrays within structures , Nested structures , Self-referential structures, Programming Example

Practical Programming List:

1. Write a program to print the size of all the data types in C and its range.
2. Write a program to convert Fahrenheit to Celsius.
3. Write a program to check whether the given number is a Prime number or not.
4. Write a program to accept three numbers and find the largest and second largest
5. Write a program to print all prime numbers between any 2 given limits.
6. Write a program to print all the Armstrong numbers between any 2 given limits.
7. Write a program to check whether the string is a Palindrome.
8. Write a program to check whether a given matrix is an Identity matrix or not.
9. Write a program to perform matrix multiplication.
10. Write a program to count the different vowels in a line of text.
11. Write a program to accept two numbers and perform various arithmetic operations (+, -, *, /) based on the symbol entered.
12. Write a program to find the roots of a quadratic equation
13. Write a recursive program to find the factorial of a number.
14. Create an employee structure and display the same.
15. Write a function to swap two numbers using pointers.
16. Write a program to access an array of integers using pointers.

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Semester: II

Minor

Paper-1: INSTRUMENTATION

Theory: 30 Hours (30Lectures) Credits -02

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Course Outcomes:

After completion of this course students will be able to:

1. Describe the working principle, selection criteria and applications of various transducers used in instrumentation systems.

2. Gain knowledge about different type of signal conditioning circuits, data converters and Understand construction, working principle of different types of digital instruments.

3. Analyze the design of an analog to digital converter and digital to analog converter.

4. Apply Data Acquisition system and ADC & DAC in real time measuring system

Unit-1: Transducers (08)

Definition of transducer, Classification of transducers: Active and passive transducers. Specifications of transducers: (Accuracy, range, linearity, sensitivity, resolution, reproducibility).

Temperature transducers: Resistance temperature detector (RTD), Thermistors, Thermocouple
Pressure transducers: Piezoelectric transducer, capacitive transducer, displacement transducer (LVDT), Optical transducers: (LDR)

Unit-2: Signal Conditioning (08)

Introduction to signal conditioning, Block diagram of Op-Amp, ideal characteristics of Op-Amp, Applications of Op-Amp: Inverting amplifier, Non inverting amplifier, Voltage follower, Adder, Subtractor, Comparator, Three Op-Amp instrumentation amplifier, Introduction to Op-Amp Attenuators, I to V converter, Sample and Hold circuit.

Unit-3: Data Converters (06)

Digital to Analog Converter (DAC): Weighted Resistor, R-2R ladder, Parameters: (Linearity, resolution, accuracy), Analog to Digital Converter (ADC): Types of ADC: Parallel/Flash, Successive approximation, Parameters of ADC (Linearity, resolution, conversion time, accuracy).

Unit-4: Data Acquisition System and Digital Instruments (08)

Introduction to Generalized Data Acquisition System (Single channel and multi-channel), Digital Instruments: Digital Multimeter, Digital Tachometer, Digital pH Meter, Digital Phase Meter.

Recommended Books:

1. Sensors &Transducers: Dr. A. D. Shaligram: CTC Publication.
2. Op-Amps and Linear Integrated Circuits: Ramakant Gayakwad PHI: 4th Ed.
3. Electronic Instrumentation: H. S. Kalsi: TMH: 2nd Edition.
4. Modern Electronic Instrumentation and Measurement Techniques: Albert D. Helfrick, William D. Cooper: PHI Publication.

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Semester: II
Paper-II: DIGITAL ELECTRONICS - II
Theory: 30 Hours (30Lectures) Credits -02

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Course Outcomes:
After completion of this course students will be able to:

1. Explain and compare the working of multivibrators using special application IC 555. Understanding and designing of multivibrator circuit, various memories and differentiate them.
2. Describe the architecture and functional block diagram of 8085 microprocessor along with pins and their functions.

3. Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.

(08)

UNIT 1: Memory Devices and Memory Organization
Types of Memory – RAM (SRAM and DRAM), ROM, PROM, EPROM, and EEPROM, Concept of Diode Matrix ROM, Memory organization - building the required memory size by using available memory chips, memory address map.

(06)

UNIT 2: Introduction to Microprocessor
Introduction to microprocessors (8, 16, 32 Bits). Pin Diagram and Architecture of 8085. Pin Diagram and Architecture of 8086.

(08)

UNIT 3: Instruction Set of 8085 Microprocessor
Introduction, Classification of instructions, instruction format, Addressing Modes, Data transfer instructions, Arithmetic instructions, Logical instructions, Branch and control instructions.

(08)

UNIT 4: Programming with 8085 Microprocessor
Format of Assembly Language Program (ALP), Assembly Language Program for Addition, Subtraction, Multiplication, Division, Data transfer, Block Transfer.

Reference Books:
1. Microprocessor Architecture Programming & applications with 8085 by R. S. Goankar, 4 th edition Prentice Hall.
2. Microprocessors and Interfacing by Douglas V Hall, 2 nd edition, Tata McGraw-Hill (2005)
3. Microprocessor 8085 by V.S. Kore, Mahalakshmi Publications
4. Fundamental of Microprocessor and Microcomputers –by B.Ram, 5th edition, Danpat Rai Publications.

Electronics –Practical Lab- I and II

Group A:
1. Study of Electronic Components
2. Study of CRO
3. Study of P-N junction diode characteristics
4. Study of full wave rectifier with & without filter (calculation of ripple).
5. Study of Transistor characteristics (CE) configuration.
6. Study of Transistors as switch
7. Study of Op Amp as inverting and Non-inverting Amplifier.
8. Study of Op Amp as adder and subtractor.
9. Study of Instrumentation Amplifier.
10. Study of LVDT.
11. Study of ON OFF controller using LM 35 temp. Sensor
12. Study of Porch light control using LDR

13. Study of 3 bit parallel/flash ADC
14. Study of R to 2R Ladder DAC
15. Study of Diode Matrix ROM

Group B:

1. Study of Basic gates.
2. Universal building block using NAND and NOR gates.
3. Verification of De-Morgan's Theorems.
4. Study of Half & full adder.
5. Study of Half & full subtractor.
6. Study of Flip Flops:
7. Study of Multiplexer and De-Multiplexer.
8. Study of 3 bit asynchronous Counter
9. Study of Decimal to BCD Encoder.
10. Study of BCD to Seven segment Decoder
11. Arithmetic Operation using uP8085 – I.
12. Arithmetic Operation using uP8085 – II.
13. Block transfer using uP8085.
14. Block Exchange using uP8085.

At least 12 experiments from each group should be complete.

Semester: II
Open Elective
Paper-I: Operations Research
Theory: 30 Hours (30 Lectures) Credits -02

Course Outcomes:

After completion of the course, the students will be able to:

1. Learn about characteristics, scope, limitations of operations research.
2. Formulate and apply suitable methods to solve linear programming Problems.
3. Use different methods for solving transportation and assignment problems.
4. Study different techniques for solving games

[4]

Unit 1: Introduction to Operations Research

- Basics of operations research
- Different definitions of operations research
- Characteristics, scope, limitations of operations research

[8]

Unit 2: Linear Programming Problem

- Basics definitions
- Solution of L.P.P by Simplex method and examples
- Definition of Dual Problem and examples

[14]

Unit 3: Transportation and Assignment problem

- Basics of Transportation problem
- Basic Definitions
- Initial Solution
- North – West corner method and examples
- Matrix minima method and examples
- Vogel's approximation method and examples
- MODI method and examples
- Maximization in transportation problem and Examples
- Unbalanced transportation problem and examples
- Introduction to Assignment problem
- Hungarian method and examples
- Maximization in Assignment problems and examples

Unit 4: Theory of Games

[4]

- Basics definitions
- Saddle point and examples
- Algebraic method for 2×2 size game and examples
- Arithmetic method for 2×2 size game and examples

Recommended Book:-

- Numerical Method and Operations Research , S.R Patil and D.M.Pandhare by Nirali Publication .

Reference Books:-

- Operations Research , S.D Sharma .
- Operations Research , Gupta and Hira .
- Operations Research , J K sharma , Second edition .

Mathematics Lab (Credit-04)

Practical No.	Title of Practical
1	Gaussian Elimination method and Gauss-Jordan method

2	Fermat's theorem
3	Matrix representation of graphs
4	Recurrence Relations
5	Plane Linear transformation 1 Scaling, Shearing, Reflection and Rotation about origin
6	Plane Linear transformation 2 Rotation about arbitrary point, Reflection through arbitrary line Combined transformation matrix
7	Space linear transformation Scaling, Shearing and Rotation about Co-ordinate axis Reflection through Co-ordinate planes, Translation Multiple transformations, Rotation about a line parallel to Co-ordinate axis, Rotation through planes which are parallel to Co-ordinate planes, Reflection through arbitrary planes (algorithm only)
8	Plane Curves Generation of points on circle and ellipse (Algorithm and examples)
9	Linear programming Problem Simplex method (maximization and minimization problems)
10	Initial solution of transportation problem North-West Corner method, Matrix minima method Vogel's approximation Method
11	MODI Method
12	Game Theory Tow -person zero sum game with saddle point , Arithmetic Method and Algebraic method

Open Elective
Theory: 30 Hours (30 Lectures) Credits -02
Descriptive Statistics -II

Course Outcomes - At the end of this course students will be able to

CO1. Distinguish between Deterministic and Non-deterministic experiments.

CO2.Understand the basic concepts of probability, conditional probability and

independence of events.

CO3. Learn theorems on probabilities and compute probabilities.
CO4. Understand the concept of discrete random variable, probability distributions and mathematical expectation.

Unit-1 Probability: [7]
- Idea of permutation and combination, concept of experiments and random experiments.
- Definitions: sample space (finite and countably infinite), events, types of events, power set (sample space consisting at most 3 sample points).
- Classical (apriori) definition of probability of an event, equiprobable sample space, simple examples of probability of an events based on permutations and combinations, axiomatic definition of probability with reference to finite and countably infinite sample space.
- Theorems on probability : i) $P(\Phi) = 0$ ii) $P(A') = 1 - P(A)$ iii) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ iv) If $A \subseteq B$, $P(A) \leq P(B)$ v) $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$

Unit-2 Conditional probability and independence of events: [8]
- Definition of conditional probability of an event, examples.
- Partition of sample space, Baye's theorem (only statement) and examples.
- Concept of independence of two events, examples.
- Proof of the result that if A and B are independent events then i) A and B', ii) A' and B, iii) A' and B' are also independent.
- Pairwise and complete independence of three events, examples.

Unit-3 Univariate probability distributions (defined on finite and countably infinite sample space) [7]
- Definitions: discrete random variable, probability mass function (p.m.f.), cumulative distribution function (c.d.f.), properties of c.d.f., median, mode and examples.
- Definition of expectation of a random variable, expectation of a function of random variable.
- Results on expectation : i) $E(c) = c$, where c is constant. ii) $E(aX + b) = a E(X) + b$, where a and b are the constants.
- Definition of mean and variance of univariate distributions.

Unit-4 Some standard discrete probability distributions: [8]
- Discrete uniform distribution: p.m.f., mean and variance, examples.
- Binomial distribution: p.m.f., mean and variance, additive property of binomial variates, recurrence relation for probabilities, examples.
- Geometric distribution: p.m.f., mean and variance, additive property, recurrence relation for probabilities, examples.

- Poisson distribution: p.m.f., mean and variance, additive property, recurrence relation for probabilities, Poisson distribution as a limiting case of binomial distribution (without proof), examples.

Semester: II
Skill Enhancement Course (SEC) (Credit 02)

Course Title: Excel For beginner

Course Outcomes:

After completion of this course students will be able to:

1. Understand basic knowledge of MS-Excel

2. Formatting techniques and presentation style.

3. Manipulate data using data names and ranges, filters and sort, and validation lists.

4. Learning the use and utility of functions and formulas on excel spreadsheet.

Module 1

1. Manage Workbook Options and Settings

1.1. Create Worksheets and Workbooks: - Create a workbook, import data from a delimited text file, add a worksheet to an existing workbook, Copy and move a worksheet.

1.2. Navigate in Worksheets and Workbooks: -Search for data within a workbook, navigate to a named cell, range, or workbook element, Insert and remove hyperlinks.

1.3. Format Worksheets and Workbooks: - Change worksheet tab colour, rename a worksheet, Change worksheet order, Insert and delete columns or rows, Change workbook themes, adjust row height and column width, Insert headers and footers.

1.4. Customize Options and Views for Worksheets and Workbooks: - Hide or unhide worksheets, Hide or unhide columns and rows, Customize the Quick Access toolbar, Modify document properties, Display formulas.

1.5. Configure Worksheets and Workbooks for Distribution: - Inspect a workbook for hidden properties or personal information, inspect a workbook for accessibility issues, Inspect a workbook for compatibility issues

2. Apply Custom Data Formats and Layouts

2.1. Apply Custom Data Formats and Validation: - Create custom number formats, populate cells by using advanced Fill Series options, Configure data validation.

2.2. Apply Advanced Conditional Formatting and Filtering: - Create custom conditional formatting rules, create conditional formatting rules that use formulas, Manage conditional formatting rules.

2.3. Create and Modify Custom Workbook Elements: - Create and modify simple macros, Insert and configure form controls.

Module 2

3. Create Tables

3.1. Create and Manage Tables: - Create an Excel table from a cell range, convert a table to a cell range, Add or remove table rows and columns

3.2. Manage Table Styles and Options: - Apply styles to tables, configure table style options, Insert total rows

3.3. Filter and Sort a Table: - Filter records, Sort data by multiple columns, Change sort order, Remove duplicate records

4. Perform Operations with Formulas and Functions

4.1. Summarize Data by using Functions: - Insert references, perform calculations by using the SUM function, perform calculations by using MIN and MAX functions, perform calculations by using the COUNT function, perform calculations by using the AVERAGE function

4.2. Perform Conditional Operations by using Functions: - Perform logical operations by using the IF function, perform logical operations by using the SUMIF function, perform logical operations by using the AVERAGEIF function, perform statistical operations by using the COUNTIF function

4.3. Format and Modify Text by using Functions: - Format text by using RIGHT, LEFT, and MID functions, Format text by using UPPER, LOWER, and PROPER functions, Format text by using the CONCATENATE function.

Advanced Excel

Course Outcomes:
1. After completion of this course students will be able to:
2. Learning & creating charts, graphs that can easily explain or simplify complex information or data.
3. Manage workbook and prepare workbook for internationalization.

4. Learning the use and utility of functions and formulas on excel spreadsheet, analyze data using pivot table and pivot charts.

Module 1

1. Create Charts and Objects

1.1. Create Charts: - Create a new chart, add additional data series, Switch between rows and columns in source data, Analyze data by using Quick Analysis,

1.2. Format Charts: - Resize charts, Add and modify chart elements, apply chart layouts and styles, Move charts to a chart sheet

1.3. Insert and Format Objects: - Insert text boxes and shapes, insert images, modify object properties, Add alternative text to objects for accessibility.

2. Manage Workbook Options and Settings

2.1. Manage Workbooks: - Save a workbook as a template, enable macros in a workbook, Display hidden ribbon tabs

2.2. Manage Workbook Review Restrict editing: - Protect a worksheet, configure formula calculation options, protect workbook structure, manage workbook versions, Encrypt a workbook with a password

2.3. Apply Custom Data Formats and Layouts: Apply Custom Data Formats and Validation, create custom number formats, populate cells by using advanced Fill Series options, Configure data validation

2.4. Apply Advanced Conditional Formatting and Filtering: Create custom conditional formatting rules, create conditional formatting rules that use formulas, Manage conditional formatting rules

2.4. Create and Modify Custom Workbook Elements: Create custom colour formats, Create and modify cell styles, Create and modify custom themes, Create and modify simple macros, Insert and configure form controls.

2.5. Prepare a Workbook for Internationalization: - Display data in multiple international formats, apply international currency formats, Manage multiple options for +Body and +Heading fonts

Module 2

3. Create Advanced Formulas

3.1. Apply Functions in Formulas: - Perform logical operations by using AND, OR, and NOT functions, perform logical operations by using nested functions, perform statistical operations by using SUMIFS, AVERAGEIFS, and COUNTIFS functions

3.2. Look up data by using Functions: Look up data by using the VLOOKUP function, look up data by using the HLOOKUP function,

3.3. Apply Advanced Date and Time Functions: - Reference the date and time by using the NOW and TODAY functions, serialize numbers by using date and time functions

3.4. Perform Data Analysis and Business Intelligence: - Import, transform, combine, display, and connect to data, consolidate data, perform what-if analysis by using Goal Seek and Scenario Manager, calculate data by using financial functions

3.5. Troubleshoot Formulas: - Trace precedence and dependence, monitor cells and formulas by using the Watch Window.

3.6. Define Named Ranges and Objects: Name cells, Name data ranges, Name tables, Manage named ranges and objects

4. Create Advanced Charts and Tables

4.1. Create and Manage PivotTables: - Create PivotTables, modify field selections and options, create slicers, Group PivotTable data, Add calculated fields, Format data

4.2. Create and Manage Pivot Charts: - Create PivotCharts, manipulate options in existing PivotCharts, Apply styles to PivotCharts, Drill down into PivotChart details.

HEAD
DEPARTMENT OF B.SC. COMPUTER SCIENCE
(ENTIRE)
VIVEKANAND COLLEGE, KOLHAPUR
(AUTONOMOUS)