RAMAKRISHNA MISSION VIDYAMANDIRA

NEP Syllabus of B.Sc. in Computer Science

Semester-II

Course Code: 2CMSSEC1
Course Type: Skill Enhancement Course

Course Outcome:

i) Outcome: a) To be familiar with handling complex information

b) Learn how to present data visually

c) Learn how to assist business domain by presenting data visually

d) Learn to identify different types of tends on data

ii) Objective: a) Dressing up the data to make a better infographic

b) Effective data visualization to act between form and function

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2CMSSEC1: Computer Aided Data Visualization

Credit: 2 **Marks: 50**

Introduction to Spreadsheets: Spreadsheets and their applications, overview of spreadsheet software (e.g., Open office, Google Sheets, Excel), creating workbooks, modifying workbook, zooming in on a worksheet, arranging multiple workbook windows, adding buttons to the quick access toolbar, customizing the ribbon, maximizing usable space in the program window, navigating the spreadsheet interface, entering and editing data in cells saving, opening, and closing spreadsheet files. [2 L]

Working with Data and Tables: Entering and revising data, moving data within a workbook, finding and replacing data, correcting and expanding upon worksheet data, defining tables [2 L]

Performing Calculations on Data: Naming groups of data, creating formulas to calculate values (e.g., SUM, AVERAGE, COUNT), summarizing data that meets specific conditions (e.g., AVERAGEIF, COUNTA, COUNTBLANK, COUNTIFS, SUMIF, IFERROR etc), finding and correcting errors in calculations. [2 L]

Changing Workbook Appearance: Formatting Cells, defining styles, workbook themes and table styles, making numbers easier to read, changing the appearance of data based on its value, adding images to worksheets. [2 L]

Data Analysis and Manipulation: Limiting data appearance on screen, working with text functions for data cleaning, Splitting and combining data, Data normalization and standardization, working with ranges and named ranges, conditional formatting, data validation and error checking, using logical functions (e.g., IF, AND, OR), sorting and filtering data. [4 L]

Advanced Spreadsheet Features: Creating and managing tables, creating and modifying pivot tables, using lookup functions (e.g., VLOOKUP, HLOOKUP), working with charts and graphs, importing and exporting data. [4 L]

Statistical Functions and Analysis: Descriptive statistics (mean, median, mode, variance, etc.), Calculating measures of central tendency and dispersion, Correlation and regression analysis, Hypothesis testing and confidence intervals, Analysis of variance (ANOVA). [5L]

Pivot Tables and Data Aggregation: Creating pivot tables for data summarization, grouping and aggregating data by categories, Applying filters and slicers to pivot tables, calculating calculated fields and items. [4 L]

Advanced Data Visualization: Creating charts and graphs for data representation, Customizing chart elements (titles, axes, legends), Using sparklines and data bars for visual analysis, Creating interactive dashboards, Incorporating trendlines and forecasting in charts. [5 L]

Exploratory Data Analysis: Identifying patterns and outliers in data, Creating histograms and box plots, Using conditional formatting for data visualization, Data segmentation and drill-down analysis, Applying data validation rules for data integrity. [4 L]

Advanced Analysis Techniques: Using goal seek and solver for optimization problems, Performing "what-if" analysis with data tables, Simulating data using random number functions, Monte Carlo simulation for risk analysis, creating scenario analysis models. [4 L]

Reporting and Presentation of Results: Designing informative reports and summaries, creating interactive dashboards for data presentation, data visualization best practices, documenting data analysis processes presenting findings to stakeholders. [3 L]

Collaboration and Sharing: Protecting worksheets and workbooks, sharing spreadsheets with others, tracking changes and commenting, collaborating in real-time, using version history and revision control. [4 L]

2CMSSEC1: Computer Aided Data Visualization Laboratory

Credit: 1 **Marks: 25**

1. Create a personal budget spreadsheet that tracks income, expenses, and savings over a specified period. Use formulas and functions to calculate totals, percentages, and remaining balances.

2. A dataset containing sales data for a company to be provided. A spreadsheet to be created that calculates monthly sales totals, identifies top-selling products, and visualizes sales trends using line charts or bar graphs. Use conditional formatting to highlight exceptional sales performances.

3. Design a grade book spreadsheet that calculates students' final grades based on assignments, exams, and participation. Incorporate weighted grading systems, formulas for calculating averages, and conditional formatting to indicate performance levels. Generate reports to track individual student progress.

4. Create a spreadsheet that tracks inventory for a hypothetical business. Include columns for item names, quantities, prices, and total values. Use formulas to automatically update inventory totals, generate alerts for low stock, and create visualizations to represent inventory levels over time.

5. Loan parameters, such as principal amount, interest rate, and loan term to be provided. Create a spreadsheet that calculates monthly loan payments, remaining balances, and interest paid over time using appropriate formulas. Create a chart to visualize the loan's repayment schedule.

6. Dataset to be provided which will allow various data analysis tasks using spreadsheets. Calculation of summary statistics, sorting and filtering data, creating pivot tables for deeper insights, and generation of charts or graphs to visualize patterns or trends within the data.

7. A dataset to be selected (e.g., stock prices, weather data, population growth, etc) and create line charts or area charts to visualize trends over time. Students should choose appropriate chart types, label axes, and add titles and legends to make the visualization clear and informative.

8. A dataset containing information about different products or variables (e.g., sales data, customer satisfaction ratings) to be provided and following to be done; create bar charts or column charts to compare the performance or rankings of the items. Use color, data labels, and chart elements to enhance the visual comparison.

9. A dataset containing time-series data for multiple variables (e.g., monthly sales data for different products) to be provided and the following task to be performed; to create a combo

chart with lines and columns to compare the trends of the variables and identify any relationships or patterns.

10. To create a unique visualization using advanced spreadsheet features and tools. For example, an experiment with sparklines, radar charts, or treemaps to represent specific types of data or explore innovative ways to visualize information.

[30 L]

Note: The assignments listed below are illustrative examples and not an exhaustive list. They serve as a starting point to cover various aspects of the course.

Recommended Books:

1. Data Analysis and Decision Making with Microsoft Excel" by S. Christian Albright.

2. Microsoft Excel 2019 Data Analysis and Business Modeling, Sixth Edition, Wayne L. Winston, Pearson education.

3. Excel 2019 Bible, Michael Alexander, 11th edition, Wiley.

4. Microsoft Office 2019 for Dummies, Wallace Wang, Wiley.