Savitribai Phule Pune University

Waghire College of Arts, Commerce and Science

Faculty of Bachelor of Vocation in Computer Software Development

Structure and Syllabus for Four Year B.Voc. Degree in Computer Software Development course as per National Education Policy - 2020

With effect from June 2025

Preamble

The field of computing is rapidly expanding and changing, especially, since the last decade with continuous emergence of new disruptive technologies such as artificial intelligence, data science, cybersecurity, Internet of things, robotics and so on.

21st Century has witnessed rapid technological developments in every sector including the field of Computing. Moreover, it has created new job roles and massive job opportunities for budding graduates. Premium Institutes, public and private Universities, autonomous and affiliated colleges in India have always played a crucial role in producing human resources with required skill sets by capturing and monitoring these developments and offered various UG and PG programs.

This is four year Under Graduate Course in Computer Software Development aims to give adequate expertise to a student to enable him/her to utilize computers for maximum benefit in an office or business environment .It will also enable a student to develop programs of his/her own to enhance productivity in such an environment. It will provide the necessary skills to make the successful candidates proficient in software development, paying the way for self-employment. The course is oriented more towards programming and software than to hardware.

Objectives of the Programme

Professionalism:

Graduates should demonstrate professional and ethical principles, and maintain high standards of practice.

Communication:

Graduates should have strong communication and interpersonal skills.

Problem solving:

Graduates should be able to solve software and system challenges, and embrace problem solving as a natural part of their work.

Teamwork:

Graduates should be able to work as part of a team, and be valued by their teammates.

Adaptability:

Graduates should be able to adapt to changing environments, and use the appropriate theory and processes to do so.

Lifelong learning:

Graduates should be committed to lifelong learning, and continually acquire new skills and knowledge.

Project management:

Graduates should be able to manage a simple project, and contribute to more complex projects as part of a team.

Software development:
Graduates should be able to develop and evaluate software, hardware infrastructure, and network solutions.

Program Outcomes (POs)

Graduates will be able to:

PO1: Knowledge of computers, Operating system, Basic Programming Language and Management Skills.

PO2: Programming Language, DBMS Concepts.

PO3: Use their learned skills, knowledge and abilities to develop web sites for the internet.

PO4: Analyze how to design software's, ERP models and personal recruitment process in organizations.

PO5: Students will able to understand actual working of IT industry and design Desktop and Web Applications

PO6: Students well knowledge of design, implements and deploy Desktop and Web Applications and latest trends in technology

PO7: They will able to understand the recent concepts in IT industry

PO8: Better understand knowledge of Big Data and Data Mining

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1. Introduction

The B. Voc. Degree Course (2025 pattern) will be introduced in the following order: -

a. First Year B.Voc. in Computer Software Development	**2025-2026**
b. Second Year B.Voc. in Computer Software Development	**2026-2027**
c. Third Year B.Voc. in Computer Software Development	**2027-2028**
d. Fourth Year B.Voc. in Computer Software Development	**2028-2029**

The B. Voc. Degree Course will consist of eight semesters divided into four Years.

The first year (Semester I and II) choice-based credit system examination will be held at the end of each semester.

The Second Year (Semester III and IV), Third Year (Semester V and VI) and Fourth Year (Semester VII and VIII) choice-based credit system examination will be held at the end of each semester.

2. Eligibility

a) **No Candidates shall be admitted to the First Year of the B. Voc. in Computer Software Development. Degree Course (2025 pattern) unless he/she has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board of Higher Secondary Education Boarder equivalent or University with English as a passing Course.**

b) **No candidate shall be admitted to the Third Semester examination of the second year unless he/ she has cleared first two semesters satisfactorily for the course at the college affiliated to this University.**

c) **No student shall be admitted to the Third Year B.Voc. (Fifth semester) Degree Course (2025 pattern) unless he/she has cleared all the papers of first and second semester Examination of F.Y. B.Voc.**

d) **No candidate shall be admitted to the Fifth Semester examination of the third year unless he/ she has cleared first two semesters satisfactorily of second year for the course at the college affiliated to this University.**

e.) No candidate shall be admitted to the Fourth Year B.Voc. (Seventh semester) Degree Course (2025 pattern) unless he/she has cleared all the papers of third and fourth semester Examination of S.Y. B.Voc.

3. Examination: -

- **A student cannot appear for semester end examination unless he/she has maintained 75% attendance during the teaching period of that course. If a student fails to maintain attendance up to 75%, at the time of filling of examination forms, an undertaking from the student should be taken stating that he/she will be allowed to appear for examination subject to fulfillment of required attendance criteria during the remaining period of teaching of the course.**
- **Each credit will be evaluated for 25 marks.**
- **Each course will have a distribution of 15:35 for CIE and SEE.**
- **To pass a course, the student has to obtain at least forty percent marks in the CIE and SEE separately.**
- **If a student misses CIE examination, he/she will have a second chance with the permission of the teacher concerned. Such a second chance shall not be the right of the student; it will be the discretion of the teacher concerned to give or not to give second chance to a student to appear for internal assessment.**
- **A student cannot register for the third, fifth and seventh semester, if he/she fails to complete 50% credits of the total credits expected to be ordinarily completed within two semesters.**
- **No student shall be admitted to the Fifth Semester examination of the third year unless she/ she has cleared first two semesters.**
- **No student shall be admitted to the Fourth Year B.Voc. (Seventh semester) Degree Course (2025 pattern) unless he/she has cleared all the papers of third and fourth semester Examination of S.Y. B.Voc. and has satisfactorily kept terms for the third year(Fifth and Sixth Semester).**
- **There shall be revaluation of the answer scripts of semester-end examination but not of internal assessment papers as per Ordinance no 134 A and B.**

3. A.T.K.T. Rules:

The present relevant ordinances issued by the SPPU pertaining to ATKT are applicable.

4. University Terms

The dates for the commencement and conclusion of the first and the second terms shall be as determined by the University Authorities. Only duly admitted students can keep the terms. The present relevant ordinances pertaining to grant of terms will be applicable.

5. Verification And Revaluation

The candidate may apply for verification and revaluation or result through Principal of the College which will be done by the University as per ordinance framed in that behalf.

6. Restructuring Of Courses

This revised course structure shall be made applicable to the colleges implementing „Restructured Programme at the undergraduate level from June, 2025. The Colleges under the Restructured Programme which has revised their structure in the light of the "2025 Pattern" shall be introduced with effect from academic year 2025-26.

7. Standard Of Passing.

A candidate is required to obtain 40% marks in Internal Assessment, Practical Examination and Semester End University Examination.

It means that passing separately at internal assessment, practical examination and semester end university examination is compulsory.

8. Methods Of Evaluation, Passing, And Evaluation Criteria: -

The evaluation of students will be done on three parameters: -

a. **Internal assessment**

b. **Practical Examination (If applicable)**

c. **University examination**

For university examination, question papers will be set for seventy percent of the total marks allotted for the course. Evaluation will be done on a continuous basis, three times during each semester. Internal assessment will be of thirty percent of the total marks allotted for the subject. The colleges need to adopt any three out of the following methods for internal assessment: -

a. **Test**

b. **Quiz**

c. **Presentations**

d. **Projects**

e. **Assignments**

f. **Tutorials**

g. **Oral examination**

Type of courses offered under the NEP 2020

Abbreviation	Full form	Purpose
MM	Major Mandatory	Subject in which degree will be awarded
GE /OE	Generic Elective / Open Elective	To provide multidisciplinary knowledge
VSC	Vocational Skill Enhancement Course	Domain area skill development
SEC	Skill Enhancement Course	Practical Training to enhance employability
VEC	Value Education Course	Environmental Science
IKS	Indian Knowledge System	Foundational guide to the history, culture and philosophy of India
CC	Co-Curricular Courses	Overall Development
AEC	Ability Enhancement Course	Languages proficiency
FP	Field Projects	For industry Experience
CEP	Community Engagement Programme	Exposure to social issues
OJT	On the Job Training	Hands on Training

Credit Framework:

2. Credit Framework under Three/Four-Years UG Programme with Multiple Entry and Multiple Exit options:

The structure of the Three/Four-year bachelor's degree programme allows the opportunity to the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning in different institutions. The minimum and maximum credit structure for different levels under the Three/Four -year UG Programme with multiple entry and multiple exit options are as given below:

Credit Framework

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
4.5	UG Certificate	40	44	2	1
5.0	UG Diploma	80	88	4	2
5.5	Three Year Bachelor's Degree	120	132	6	3
6.0	Bachelor's Degree-Honours Or Bachelor's Degree-Honours with Research	160	176	8	4

Structure of Examination and scheme of marking for First Year B. Voc. Programme

Semester I – B. Voc. In Computer Software Development

Sr. No.	Subject Code	(Vertical Level)	Course / Subject Title	Theory / Practical	Credits	Maximum Internal Marks	Maximum External Marks
1	CSD-101	MJM(T)	Web Technology-I	Theory	02	15	35
2	CSD-102	MJM(P)	Practical on Web Technology-I	Practical	02	15	35
3	CSD-103	MJM(T)	Basic C programming	Theory	02	15	35
4	CSD-104	MJM(P)	Practical on C Programming	Practical	02	15	35
5	CSD-105	MJM(T)	Computer Fundamental and Office Automation	Theory	02	15	35
6	CSD-106	MJM(P)	Practical on Office Automation Tools	Practical	02	15	35
7	CSD-107	SEC(T)	E-Commerce	Theory	02	15	35
8	CSD-108	AEC(T)	Business Communication Skills-I	Theory	02	15	35
9	CSD-109	VEC(T)	Environmental Awareness-I	Theory	02	15	35
10	CSD-110	IKS(T)	Indian Knowledge System(Generic)	Theory	02	15	35
11	OE-101-ECO	OE(T)	Indian Economic Policy-I (From Humanities Faculty)	Theory	02	15	35
	Total				22		

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Web Technology-I

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-101	Major Mandatory (MJM(T))	Web Technology-I	2	3

Objectives of the Course:

1. Web Technology refers to the many different tools and techniques that are utilized in the process of communication between different types of devices over the internet in Hindi/English Language.
2. The main sections or components of Web Technology are World Wide Web (WWW), Web Browser, Web Server, Web Pages, and Web Development.
3. It can be classified into two ways: Frontend and Backend Development. The part of a website where the user interacts directly is termed as front end.
4. It is the part of software that does not come in direct contact with the users. It is used to arrange/store data.

Course Outcome:

By the completion of the course, student will be able to:

CO1 : To know the basic of Internet and different Protocols.

CO 2 : Students should understand the basic concept of internet and its related languages

CO3 : Students should know the functions and string in HTML.

CO4 : Students should know the basics of CSS

Topics and Learning Points

Topi cNo	Topic Name	Sub Topic	No. of Periods
1	**Introduction to Web Technologies**	1 .1 Introduction 1.2 Clients-Servers and Communication 1.3 Internet-Basic, Internet Protocols(HTTP,FTP,IP) 1.4 World Wide Web(WWW) 1.5 HTTP request message, HTTP response message	10
2	**Web Design**	2.1 Concepts of effective web design 2.2 Web design issues including Browser Band width and Cache 2.3 Page Layout and linking 2.4 Planning and publishing website 2.5 Types of website	08
3	**HTML**	3.1 Introduction to HTML 3.2 HTML tags ands attributes 3.3 Working with Elements. 3.4 Inserting Image 3.5 List 3.6 Tables 3.7 Text and Image links 3.8 Frames	06

		3.9 Forms and controls Introduction with text box, text area buttons, List box, radio, checkbox	
4	**CSS**	4.1 Need for CSS 4.2 Introduction to CSS 4.3 Basic syntax and structure 4.4 Using CSS background images ,colors and properties Manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS	06

References:

1. Internet and World Wide Web, How to Program, Dietel and Dietel, Pearson Education.
2. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
3. Web Technologies – Achyut S Godbole and Atul Kahate
4. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage
5. Web Technologies, Uttam K Roy, Oxford
6. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
7. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
8. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

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As per NEP -2020

Subject: - Practical on Web Technology –I

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-102	Major Mandatory (MJM)(P)	**Practical on Web Technology-I**	2 (1 Credit = 30 Hours of Lab Work)	5

Objectives of the Course:

1. Web Technology refers to the many different tools and techniques that are utilized in the process of communication between different types of devices over the internet in Hindi/English Language.
2. The main sections or components of Web Technology are World Wide Web (WWW), Web Browser, Web Server, Web Pages, and Web Development.
3. It can be classified into two ways: Frontend and Backend Development. The part of a website where the user interacts directly is termed as front end.
4. It is the part of software that does not come in direct contact with the users. It is used to arrange/store data.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : To know the basic of Internet and different Protocols.

CO 2 : Students should understand the basic concept of internet and its related languages

CO 3 : Students should know the functions and string in HTML.

CO 4 : Students should know the basics of HTML

Guidelines for student Journal:

- The laboratory assignments are to be submitted by student in the form of journal.
- Journal consists of Certificate, table of contents, and handwritten write-up for each assignment.
- Write-up shall include Title, Problem Statement, software and Hardware requirements, Date of Completion.
- Program codes with sample output of all performed assignments are to be submitted as softcopy.
- Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be retained with program prints.

Guidelines for Assessment:

- Continuous assessment of laboratory work is to be carried out based on overall performanceof students.
- For each lab assignment, the instructor will assign grade/marks based on parameters such as timely completion, understanding, neatness etc. with appropriate

Topics and Learning Points

Unit	Title of Assignment	No. of Lectures (Per Lecturein Clock Hours)
1	Assignment 01:-Basic HTML Tags	8
2	Assignment 02:-Creating List through HTML	12
3	Assignment 03:-Creating Tables through HTML	12
4	Assignment 04:- Creating Frames through HTML	8
5	Assignment 05:- Creating Forms through HTML	8
6	Assignment 06:-Styling HTML with CSS	12

References:

1. Internet and World Wide Web, How to Program, Dietel and Dietel, Pearson Education.
2. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
3. Web Technologies – Achyut S Godbole and Atul Kahate
4. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage
5. Web Technologies, Uttam K Roy, Oxford
6. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
7. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
8. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

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As per NEP -2020

Subject: - Basic C Programming

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures perWeek
I	B. voc. in Computer Software Development	CSD-103	Major Mandatory (MJM)(T)	Basic C Programming	2	3

Objectives of the Course:

1. To provide a broad overview of problem solving techniques.
2. To learn C programming to solve problems.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : Students should understand Fundamental of „C" Language, Tokens and Operators

CO 2 : Learn Console Input Output Functions and Operations

CO 3 : Understand Decision making and looping Statements

CO 4 : To formulate algorithms, pseudo codes and flowcharts for arithmetic and logical problems

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Periods
1	**C Fundamentals**	1.1 Introduction to problem solving using computers. 1.2 Problem solving steps. 1.3 Algorithms-definition, characteristics , examples , advantages and limitations. 1.4 Flowcharts - definition, notations , examples , advantages and limitations, 1.5 Types of languages 1.6 Compilation process 1.7 History & Application area of „C" language. 1.8 Structure of a C program. 1.9 C Program development lifecycle. 1.10 C tokens 1.11 Data Types (Built-in and user defined data types). 1.12 Types of Operators 1.13 Character input and output. 1.14 String input and output. 1.15 Formatted input and output	10

2	**Control Structures**	2.1 Decision making structures:- if ,if-else, switch and conditional operator. 2.2 Loop control structures:- while ,do while, for. 2.3 Use of break and continue. 2.4 Nested structures. 2.5 Unconditional branching (goto statement).	08
3	**Functions**	3.1 Concept of function, Advantages of Modular design. 3.2 Standard library functions. 3.3 User defined functions:-declaration, definition, function call, parameter passing (By value), return statement. 3.4 Recursive functions 3.5 Scope of variables and Storage classes.	06
4	**Arrays**	4.1 Concept of array. 4.2 Types of Arrays – One , Two and Multi-dimensional array. 4.3 Array Operations - declaration, initialization, accessing array elements. 4.4 Memory representation of two-dimensional array (row major and column major) 4.5 Passing arrays to function. 4.6 Array applications	06

References:

1. Cormen, Leiserson, Rivest, Stein, “Introduction to algorithms”
2. Brian W. Kernighan, Dennis M. Ritchie , “The C Programming Language”,
3. Behrouz A. Forouzan, RichardF. Gilberg, “A Structured Programming ApproachUsing C”
4. E. Balaguruswamy, “Programming in ANSI C”, ISBN: 9781259004612, Tata Mc-GrawHill Publishing Co Ltd.-New Delhi
5. Maureen Spankle, “Problem Solving and Programming Concepts”, ISBN: 81-317-0711-3
6. Y S Kanetkar, “Let Us C”, BPB Publications

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Practical on C Programming

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures perWeek
I	B. voc. in Computer Software Development	CSD-104	Major Mandatory (MJM)(P)	Practical on C Programming	2 (1 Credit = 30 Hours of Lab Work)	5

Objectives of the Course:

1. To learn formulation of algorithm for a given problem
2. To study various data types, arrays and functions in C
3. To understand input-output and, control and iterative statements in C

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : Get Practical Knowledge of C Programming.

CO 2 : Learn Basic Data Types, Operators, And Nested Loops.

CO 3 : Understand about writing, compiling and executing a program in C language.

CO 4 : Learn how to use functions and arrays.

Guidelines for student Journal:

- The laboratory assignments are to be submitted by student in the form of journal.
- Journal consists of Certificate, table of contents, and handwritten write-up for each assignment.
- Write-up shall include Title, Problem Statement, software and Hardware requirements, Date of Completion.
- Program codes with sample output of all performed assignments are to be submitted as softcopy.
- Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be retained with program prints.

Guidelines for Assessment:

- Continuous assessment of laboratory work is to be carried out based on overall performanceof students.
- For each lab assignment, the instructor will assign grade/marks based on parameters such as timely completion, understanding, neatness etc. with appropriate

Topics and Learning Points

Unit	Title of Assignment	No. of Lectures (Per Lecturein Clock Hours)
1	Assignment 01:-Data Types and Operators	8
2	Assignment 02:-Managing Input and Output	7
3	Assignment 03:-Decision Making using if and if-else	7
4	Assignment 04:-Decision Making using Switch Statement	8
5	Assignment 05:-Loop Control Structures	8
6	Assignment 06:-Nested Loops	7
7	Assignment 07:Functions	7
8	Assignment 08:-Demonstration of Arrays (1-D & 2-D array)	8

References:

1. Cormen, Leiserson, Rivest, Stein, “Introduction to algorithms”
2. Brian W. Kernighan, Dennis M. Ritchie , “The C Programming Language”,
3. Behrouz A. Forouzan, RichardF. Gilberg, “A Structured Programming ApproachUsing C”
4. E. Balaguruswamy, “Programming in ANSI C”, ISBN: 9781259004612, Tata Mc-GrawHill Publishing Co Ltd.-New Delhi
5. Maureen Spankle, “Problem Solving and Programming Concepts”, ISBN: 81-317-0711-3
6. Y S Kanetkar, “Let Us C”, BPB Publications

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Subject: - Computer Fundamental and office Automation

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-105	Major Mandatory(MJM (T))	Computer Fundamental and Office Automation	2	3

Objectives of the Course:

1. Study to use the internet safely, legally and responsibly.
2. To introduce the fundamental concepts of Computers, Hardware, Software

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : To know the basics of computer and operating system

CO 2 : Understanding the concept of input and output devices of computers

CO 3 : Learn basic word processing, Spread sheets and presentation graphics software skills.

CO 4 : Study to use the internet safely, legally and responsibly.

Topics and Learning Points

TopicNo	Topic Name	Sub Topic	No. of Periods
1	**Introduction to Computer Fundamentals**	1.1 Introduction to Computer 1.2 Computer System Hardware 1.3 Computer Memory Input and Output Devices 1.4 Interaction between User and Computer 1.5 Introduction to Free and Open Source Software Definition of Computer Virus 1.6 Types of Viruses 1.7 Use of Antivirus software	10
2	**Introduction to Business Communication Tools**	2.1 MS-Word: Introduction 2.2 Starting MS-Word and its Components 2.3 MS-Word Screen 2.4 Elementary Working with MS-Word MS-Excel 2.5 Introduction of Starting MS-Excel 2.6 Basics of Spreadsheet 2.7 MS-Excel Screen and Its Components 2.8 Elementary Working with MS-Excel MS- Power point: 2.9 Introduction of Starting MS-PowerPoint 2.10 Basics of PowerPoint 2.11 MS-PowerPoint Screen and Its Components Elementary Working with MS PowerPoint	12

3	**Use of Computer in Commerce**	3.1 Introduction 3.3 Data Processing 3.3 Files and Records 3.4 File Organization (Sequential, Direct/Random, Index) 3.5 Computer Applications in Business 3.6 Need and Scope Computer Applications in various fields of Commerce: Personnel Administration	08

References:

1. V.Rajaraman, “Fundamentals of computers”
2. Anita Goel, “Computer Fundamentals”
3. E Balguruswami, “Fundamentals of Computers”

B.Voc. in Computer Software Development

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Subject: - Practical on office Automation Tools

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-106	Major Mandatory(MJ M(P))	Practical on Office Automation Tools	2	3

Course Objectives:

- To make students understand and learn various Office Automation Tools like MSWord, MS Excel & MS PowerPoint.
- A computer office automation course aims to equip individuals with the skills to effectively use computer applications for administrative and clerical tasks. Key outcomes include

Course Outcomes:-

CO1 : The students will be able to apply various Office Automation Tools - MSWord, MS Excel & MS PowerPoint.

CO2 : Use of modern office equipment in business.

Unit	Topic	No. of Practical's
1	**Assignment 1: Practical on Word Pad**	3
2	**Assignment 2: Practical on Excel Sheets**	4
3	**Assignment 3 : Practical on PPT Presentation**	3
	Total	10

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As per NEP -2020

Subject: - E-Commerce

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-107	**Skill Enhancement Course** SEC(T)	E-Commerce	2	3

Course Objectives:

- To understand the applications of e-Commerce.
- To learn Business model knowledge.
- To enable knowledge about E-payment system.
- To get a general idea of E-commerce

Course Outcomes:-

CO1 : Learn and implement basic concepts and applications of e-Commerce.

CO2 : Understand operations of electronic payment system.

CO3 : Compare and analyze various business models.

CO4 : Understand regulatory framework for E-Commerce.

Unit	Topic Name	Sub Topic	No. of Lectures
1	**E- Commerce and Business Model Concepts**	1.1. Introduction to E Commerce: Definition, Goals, Technical Components, Functions, Status, Prospects, Significance, Advantages, Disadvantages E-Commerce 1.2. Business Models: Major Business to Consumer (B2C) Business Model Portal, E-tailor, Major Business to Business (B2B) Business Mode, E Distributor, E-Procurement, Exchanges 1.3 Business models in Emerging E-Commerce Areas - C2C, P2P, and B2G.,case studies.	**07**
2	**E-commerce Payment Method**	2.1. The requirements of an electronic payment system 2.2. Traditional payment system, Electronic payment technology. 2.3. Electronic payment gateways. 2.4. B2B electronic payments. 2.5. Third-party payment processing, electronic or digital currency, characteristics, operation. 2.6. Online credit card payments and smart cards.	**6**
3	**E-Marketing and E-Commerce Application**	3.1. Introduction, Identifying Goals, Definition 3.2. Browsing Behavior Model 3.3. Online Marketing 3.3.1 e-Commerce and retailing 3.3.2 e-Commerce and banking, 3.4. E-Advertising –Introduction, Purpose, Goals, advantages, disadvantages 3.5. Internet Marketing Trends 3.6. Target Markets	**10**

		3.7. E-Branding 3.8. Marketing Strategies 3.9. Consumer Online: The Internet Audience and Consumer Behaviors 3.10. E-cycle of Internet Marketing	
4	**Future Trends in E-Commerce**	4.1AI & Chatbots in E-Commerce. 4.2. AR/VR Shopping Experiences. 4.3. Personalization & Data Analytics. 4.4. The Role of IoT in E-Commerce.	**7**
		Total	

Reference Books:

1.Kenneth C. Laudon, E-Commerce: Business, Technology, Society, 4th Edition, Pearson
2. S. J. Joseph, E-Commerce: An Indian perspective, PHI
3. E-Commerce Law: National and Transnational Topics– Alan Davidson
4. Artificial Intelligence in E-Commerce– Richard Boire

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Subject: - Business Communication Skills –I

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-108	**Ability Enhancement Course (AEC)T**	Business Communication Skills-I	2	3

Objectives of the Course:

1. To acquaint and familiarize the students with literary terms in English Literature
2. To sensitize the students to analyze and evaluate the literary piece
3. To inculcate a sense of cultural diversity through language and literature
4. To acquaint and familiarize the students with literary terms in English Literature

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : To enable them to learn about the principles of good communication.

CO 2 : To create awareness of various methods and types of communication.

CO 3 : To introduce some advanced units of language so that they become aware of the technical aspects and their practical usage

CO 4 : To develop students‟ interest in reading literary pieces

Topics and Learning Points

Topi cNo	Topic Name	Sub Topic	No. of Periods
1	**An Introduction to Communication Skills**	1.1 Introduction and Defining Communication 1.2 The Process of Communication 1.3 Principles of Communication 1.4 Characteristics of Communication 1.5 Barriers of Communication 1.6 Oral Communication and Written Communication 1.7 Verbal Communication and Non Verbal Communication	10
2	**Presentation Skills**	2.1 Introduction and Defining Presentation 2.2 Kinds of Presentations 2.3 Format and Structuring Content 2.4 Visual Aids 2.5 Making a Presentation 2.6 Tips for Effective Presentation	10
3	**Group Discussion**	2.6 Introduction and Defining Group Discussion 3.2 Steps involved in Group Discussion 3.3 Do‟s and Don‟ts of Group Discussion 3.4 Participating in a Group Discussion 3.5 Practice and Effective participation in a Group Discussion	10

References:

1. Business Communication- Dr Saroj Hiremath
2. Business Communication- Dr. Dhiraj Zalte
3. Literary Pinnacles- Orient Blackswan Publication
4. Literary Landscapes- Orient Blackswan Publication
5. Communication Skills- Vision Publication

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Environmental Awareness-I

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-109	Value Education Course (VEC)T	Environmental Awareness-I	2	3

Objectives of the Course:

1. This course aim to teach student about environmental issues and how to protect environment.
2. Aim to help student develop a sense of responsibility towards nature.
3. Aim to encourage student to get involved in environmental causes.
4. Aim to help students develop a connection with nature.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : To know the awareness about Environmental Studies.

CO 2 : To know the awareness about Multidisciplinary nature of environmental studies

CO 3 : To create the awareness about environmental problems.

CO 4 : To develop an attitude of concern for the environment.

Topics and Learning Points

Topi cNo	Topic Name	Sub Topic	No. of Periods
1	**The Multidisciplinary Nature Of Environmental Studies**	1.1 Definition, Scope And Importance 1.2 Need For Public Awareness 1.2.1 Institutions In Environment 1.2.2 People In Environment	06
2	**Natural Resources**	2.1 Introduction 2.2 Renewable And Non-Renewable Resources 2.2.1 Natural Resources And Associated Problems 2.2.2 Non-Renewable Resources 2.2.3 Renewable Resources A. Forest Resources B. Water Resources C. Mineral Resources D. Food Resources E. Energy Resources F. Land Resources 2.3 Role Of An Individual In Conservation Of Natural Resources 2.4 Equitable Use Of Resources For Sustainable Lifestyles	08

3	**Ecosystems**	3.1 Concept Of An Ecosystem 3.1.1 Understanding Ecosystems 3.1.2 Ecosystem Degradation 3.1.3 Resource Utilization 3.2 Structure And Functions Of An Ecosystem 3.3 Producers, Consumers And Decomposers 3.4 Energy Flow In The Ecosystem 3.4.1 The Water Cycle 3.4.2 The Carbon Cycle 3.4.3 The Oxygen Cycle 3.4.4 The Nitrogen Cycle 3.4.5 The Energy Cycle 3.5 Integration Of Cycles In Nature 3.6 Ecological Succession 3.7 Food Chains, Food Webs And Ecological Pyramids 3.8 Types, Characteristic Features, Structure And Functions of Ecosystem 3.8.1 Forest Ecosystem 3.8.2 Grass land Ecosystem 3.8.3 Desert Ecosystem 3.8.4 Aquatic Ecosystems (Ponds, Lakes, Streams, Rivers, Estuaries, Oceans)	10
4	**Biodiversity And Its Conservation**	**Biodiversity And Its Conservation** 4.1 Introduction–Definition: Genetic, Species, Ecosystem Diversity 4.2 Value Of Biodiversity: Consumptive, Productive Use, Social, Ethical, Aesthetic And Option Values 4.3 Biodiversity At Global, National And Local Levels 4.4 India As A Mega Diversity Nation 4.5 Hotspots Of Biodiversity 4.6 Threats To Biodiversity: Habitat Loss, Poaching Of Wildlife, Man-Wildlife Conflicts 4.7 Endangered And Endemic Species Of India 4.7.1 Common Plant Species 4.7.2 Common Animal Species 4.8 Conservation Of Biodiversity: In-Situ And Ex-Situ	06

References:

1. "Environmental Studies "by Erach Bharucha,
2. "An Introduction to Environmental Science "by R. Raja gopalan,
3. "Environmental Science & Engineering "by B. Rajput.

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Indian Knowledge System (generic)

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-110	IKS(T)	**- Indian Knowledge System(generic)**	2 (1 Credit = 30 Hours of Lab Work)	5

Objectives of the Course:

1 To provide an overview of Indian Knowledge Systems, acquainting students with the vastand diverse knowledge that has been developed in India Throughout history.

2 The courseaims to show how this knowledge remains relevant in the modern era and to inspirestudents to delve deeper into their own studies.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : To understand the nature of knowiedge

CO 2 : The concept of ancient intellectual knowledge tradition will be understood.

CO 3 : Development in science from ancient time will be introduced.

CO 4 : Information about human development will be understood.

Topics and Learning Points

Subject Topic
1.Vedic Period : Vedasand their Significance (1 hour)
2. Upanishads : Philosophy and Knowledge (1 hour)
3. The Six Schools of Indian Philosophy: Overview (1.5hour)
4. Indian Linguistics : Paniniand Sanskrit (1hour)
5. Evolution of Other Indian languages Tamil, Marathi, Hindi etc. (1 hour)
6. Ancient Indian Education System : Gurukul System (1 hour)
7. Ancient Indian Mathematics : Overview and Contributions (1.5 hour)
8. Ancient Indian Astronomy and Astrology : Overview and Contributions
(1.5 hours)
9. Charak & Sushrut Samhita, Ayurveda : Principles and Practices (1.5hour)
10. Ancient Indian Architecture : Vastu Shastra and Temple Architecture (Part1)
(1hour)
11. Ancient Indian Architecture : Vastu Shastra and Temple Architecture

(Part2)[Duration :1hour]
12. Trade and Commercein Ancient India (1.5hours)
13. Arthashastra (Part1)(1hour)
14. Arthashastra (Part2)(1hour)
15. Ancient Indian Art and Culture (Part1)
16. Ancient Indian Art and Culture (Part2)-Duration :1Hour
17. Ancient Indian Music and Dance (Part1)(1hour)
18. Ancient Indian Music and Dance(Part2)(1hour)
19. Ancient Indian Farming Practices(1hour)
20. Ancient Indian Craftsmanship (Part1)(1hour)
21. Ancient Indian Craftsmanship (Part2)(1hour)
22. Ancient Indian Warfare and Weaponry (1.5hour)
23. Ancient Indian Engineering and Technology (1.5hour)
24. Ancient Indian Religions : Hinduism, Buddhism, Jainism, Sikhism : Teachings
and Philosophies (1.5hours)
25. Ancient Indian Knowledge Systems : Global Influence (1hours)
26. Semester1 Review and Conclusion (1hour)

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Indian Economic Policy-I

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	OE -101-ECO	Open Elective(OE)T	Indian Economic Policy-I	2	3

Objectives of the Course:

1. To develop a strong foundation of advanced economic theory aligned with the Graduation and honours program.
2. To help the students to gain the comprehensive understanding of policy making at various government levels such as, local, state, national and international.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : The Students shall be able to understand nature of Developed and Developing Economies.

CO 2 : Learners will understand major issues regarding economic development of India

CO 3 : Ability to compare and contrast Indian Economy with other world economies.

CO 4 : To familiarize the students with the recent developments in the Indian Economy

Topics and Learning Points

Topi cNo	Topic Name	Sub Topic	No. of Periods
1	**Introduction to Indian Economy**	1.1 – Economy: Meaning and Classification 1.2 - Developed and Developing Economies 1.3 - Indicators of Developed Economy 1.4 - Characteristics of Indian Economy as Developing Economy 1.5 - Major issues of Economic Development in India 1.6 – Monetary and Fiscal Policy in India	06
2	**Agriculture, Industry and Service Sector In India**	2.1– Sectoral Structure of an Economy 2.2 – Contribution in Economic Development of India: Agriculture, Industry and Service Sector 2.3 – Sectoral Distribution of Gross Domestic Product (GDP) and Employment in India 2.4 – Interdependence between Agriculture, Industry and Service Sectors 2.5 – New Economic Policy	08

References:

1.Agrawal A.N., Indian Economy Problems of Development & Planning, New Age International Publishers, New Delhi.
2. Gaurav Datt & Ashwani Mahajan (2022): 'Indian Economy' S. Chand Publishing Company Ltd., New Delhi.
3. V.K. Puri, S.K. Misra, 'Indian Economy', Himalaya Publishing House, Mumbai. (Latest Edition)

Teaching Methodology

The Teacher can use the following Methods as Teaching Methodology:

1. Class Room Lectures
2. Guest Lectures of Professionals, Industry Experts etc.
3. Teaching with the help of ICT tools
4. Visits to various Professionals Units, Companies and Business / Industry Units
5. Group Discussion / Debates
6. Assignments, Tutorials, Presentations, Role Play etc.
7. YouTube Lectures developed by MHRD, UGC, Government of Maharashtra, University etc.
8. Analysis of Case Studies

Scheme of Examination

Scheme of Examination: 1. Internal Assessment: 30% and 2. External Assessment: 70%

Scheme of Examination	**Exam Format**	**Min. PassingMarks**
Continuous Internal Evaluation (CIE) (15 Marks)	The colleges need to adopt any Two Methods out of the following Methods for Continuous Internal Evaluation: 1) Offline Written Examination 2) Power Point Presentations 3) Assignments / Tutorials 4) Oral Examination 5) Open Book Test 6) Offline MCQ Test 7) Group Discussion 8) Analysis of Case Studies	Min. 06 Marks (40% of Passing)
SEE / External Exam (35 Marks) (Total 2 Hours Duration)	***Instructions:*** *1) Question No. 1 is Compulsory.* *2) Attempt any Two Questions from Question No. 2 to 4* Q. 1: Fill in the Blanks = 05 Marks Q. 2: Theory Question on Unit-1 = 10 Marks Q. 3: Theory Question on Unit-2 = 10 Marks Q. 4: Short Notes on all Units (Any 2 out of 4) = 10 Marks	Min. 14 Marks (40% of Passing)
Total 50 Marks **Separate Passing for Internal Assessment (CIE) and External Exam (SEE)**		

Structure of Examination and scheme of marking for
First Year B. Voc. Programme
Semester II - B. Voc. in Computer Software Development

Sr. No.	Subject Code	Vertical Level	Course / Subject Title	Theory / Practical	Credits	Maximum Internal Marks	Minimum External Marks
1	CSD-201	MJM(T)	Web Technology-II	Theory	02	15	35
2	CSD-202	MJM(P)	Practical on Web Technology-II	Practical	02	15	35
3	CSD-203	MJM(T)	Advanced C programming	Theory	02	15	35
4	CSD-204	MJM(P)	Practical on Advanced C programming	Practical	02	15	35
5	CSD-205	MJM(T)	DBMS	Theory	02	15	35
6	CSD-206	MJM(P)	Practical on DBMS	Practical	02	15	35
7	CSD-207	SEC(T)	Business Mathematics	Theory	02	15	35
8	CSD-208	AEC(T)	Business Communication Skills-II	Theory	02	15	35
9	CSD-209	VEC(T)	Environmental Awareness-II	Theory	02	15	35
10	CSD-210	CC	Health and Wellness	Theory	02	15	35
11	OE-151-ECO	OE(P)	Indian Economic Policy-II (From Humanities Faculty)	Practical	02	15	35

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Web Technology-II

Semester No.	Programme Name	Subject Code	Type of Course	Cours eTitle	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-201	Major Mandatory (MJM)(T)	Web Technology-II	2	3

Objectives of the Course:

1. Client-Side Scripting: JavaScript is mainly known for its ability to run in web browsers, enabling Developers to create interactive and dynamic web pages..
2. Event Handling: JavaScript enables developers to respond to various events such as button clicks, Mouse movements, keyboard input, and form submissions.
3. DOM Manipulation: The Document Object Model (DOM) is a representation of the web page's Structure and JavaScript provides powerful methods to interact with it.
4. Asynchronous Programming: JavaScript supports asynchronous programming using techniques like callbacks, Promises, and async/await, allowing developers to handle time-consuming tasks Without blocking the main execution thread.

Course Outcome:

By the completion of the course, student will be able to:

CO 1	:	The JavaScript Specialist course focuses on the fundamental concepts of the JavaScript language.
CO 2	:	This course will empower you with the skills to design client-side, platform-independent solutions that greatly increase the value of your Web site by providing interactivity and interest.
CO 3	:	Students should understand web programming languages like JavaScript-CSS and its programming
CO 4	:	Understand the internet related concepts that are vital in understanding web application development.

Topics and Learning Points

TopicNo	Topic Name	Sub Topic	No. of Periods
1	**Introduction JavaScript**	1.1 What is JavaScript 1.2 JavaScript history 1.3 Versions of JavaScript.	06
2	**Basic data types, operators and program structure with html**	2.1 Data Types 2.2 JavaScript Operators 2.3 Conditional Statements 2.4 JavaScript Controlling (Looping) Statements 2.5 JavaScript Break and Continue 2.6 JavaScript Functions 2.7 Event 2.8 Java script with html 2.9 Validation with form	08

3	**JavaScript Arrays and object**	3.1 Arrays 3.2 Multidimensional Arrays 3.3 Array Properties 3.4 JavaScript Object Hierarchy 3.5 JavaScript Array Object 3.6 JavaScript Date Object 3.7 JavaScript Math Object 3.8 JavaScript String Object 3.9 Window Object 3.10 Document Object 3.11 History Object 3.12 Form object	09
4	**Angular Framework**	4.1 Introduction 4.2 What is type script 4.3 Versions of angular 4.4 How Angular works 4.5 Local development Environment 4.6 Identify the version of node.js that angular requires 4.7 Install the correct version of node.js 4.8 Install latest version of angular 4.9 Install integrated development environment (IDE) 4.10 Create Angular project 4.11 Run angular project	07

References:

1. JavaScript: The Definitive Guide: Master the World's Most-Used Programming Language.
2. Eloquent JavaScript: A Modern Introduction to Programming
3. JavaScript and JQuery: Interactive Front-End Web Development

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Computer Laboratory based on Web Technology-II

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures perWeek
I	B. voc. in Computer Software Development	CSD-202	Major Mandatory (MJM)(P)	Practical on Web Technology-II	2 (1 Credit = 30 Hours of Lab Work)	3

Objectives of the Course:

1. Client-Side Scripting: JavaScript is mainly known for its ability to run in web browsers, enabling Developers to create interactive and dynamic web pages..
2. Event Handling: JavaScript enables developers to respond to various events such as button clicks, Mouse movements, keyboard input, and form submissions.
3. DOM Manipulation: The Document Object Model (DOM) is a representation of the web page's Structure and JavaScript provides powerful methods to interact with it.
4. Asynchronous Programming: JavaScript supports asynchronous programming using techniques like callbacks, Promises, and async/await, allowing developers to handle time-consuming tasks Without blocking the main execution thread.

Course Outcome:

By the completion of the course, student will be able to:

CO 1	:	Students should understand the basic implementation of Javascript Programming and HTML
CO 2	:	Programming web pages with JavaScript.
CO 3	:	Analyze and apply the role of markup languages like HTML, DHTML, and XML in the workings of the web and web applications.
CO 4	:	Design and implement dynamic web pages using client-side programming Java Script and also develop the web application using servlet and JSP.

Guidelines for student Journal:

- The laboratory assignments are to be submitted by student in the form of journal.
- Journal consists of Certificate, table of contents, and handwritten write-up for each assignment.
- Write-up shall include Title, Problem Statement, software and Hardware requirements, Date of Completion.
- Program codes with sample output of all performed assignments are to be submitted as softcopy.
- Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be retained with program prints.

Guidelines for Assessment:

- Continuous assessment of laboratory work is to be carried out based on overall performanceof students.
- For each lab assignment, the instructor will assign grade/marks based on parameters such as timely completion, understanding, neatness etc. with appropriate

Topics and Learning Points

Unit	Title of Assignment	No. of Lectures (Per Lecturein Clock Hours)
1	Assignment 01:- Introduction JavaScript	8
2	Assignment 02:- Basic data types, operators and program structure with html	12
3	Assignment 03:- JavaScript Functions	12
4	Assignment 04:- JavaScript Arrays	8
5	Assignment 05:- JavaScript object	8
6	Assignment 06:- Angular Framework	12

References:

1. JavaScript: The Definitive Guide: Master the World's Most-Used Programming Language.
2. Eloquent JavaScript: A Modern Introduction to Programming
3. JavaScript and JQuery: Interactive Front-End Web Development

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Advanced C Programming

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-203	Major Mandatory (MJM)(T)	Advanced C Programming	2	3

Objectives of the Course:

1. To learn advanced features in C Programming.
2. To study advanced data types.
3. To understand built-in library functions.
4. To understand code organization with complex data types and structures.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : Get practical knowledge of Advance C Programming.

CO 2 : Learn the fundamental building blocks of C Language like constants, variables, identifiers, operators, type conversion.

CO 3 : To write programs in C-language that involves decisions and iterations.

CO 4 : Understand the implementation of functions, arrays and pointers in C programming language.

Topics and Learning Points

TopicNo	Topic Name	Sub Topic	No. of Periods
1	**Pointers**	1.1. Introduction to Pointers. 1.2. Declaration, definition, initialization, dereferencing. 1.3. Pointer arithmetic. 1.4. Relationship between Arrays & Pointers-Pointer to array, Array of pointers. 1.5. Multiple indirection (pointer to pointer). 1.6. Functions and pointers-Passing pointer to function, Returning pointer from function, Function pointer. 1.7. Dynamic memory management- Allocation (malloc(), calloc()), Resizing (realloc()), Releasing (free()). 1.8. Types of pointers.	8
2	**Strings**	2.1 String Literals, string variables, declaration, definition, initialization. 2.2 Syntax and use of predefined string functions 2.3 Array of strings. 2.4 Strings and Pointers	06

3	**Structures & Unions.**	3.1 Concept of structure, definition and initialization, use of typedef. 3.2 Accessing structure members. 3.3 Nested Structures 3.4 Arrays of Structures 3.5 Structures and functions-Passing each member of structure as a separate argument, Passing structure by value / address. 3.6 Pointers and structures. 3.7 Concept of Union, declaration, definition, accessing union members. 3.8 Difference between structures and union.	06
4	**File Handling**	4.1. Introduction to streams. 4.2. Types of files. 4.3. Operations on text files. 4.4. Standard library input/output functions. 4.5. Random access to files.	06
5	**Preprocessor**	5.1 Role of Preprocessor 5.2 Format of preprocessor directive 5.3 File inclusion directives(#include) **5.4** Macro substitution directive, argumented and nested macro **5.5** Macros versus functions	04

References:

2. The C Programming Language (Second Edition) – By B. W. Kerninghan & D. M. Ritchie
3. Programming in C – A Practical Approach – By Ajay Mittal (Pearson Publications)
4. Programming with C – By Byron S Gottfried (Schaum‟s Outlines)
5. A structural Programming Approach using C – By Behrouz Forouzan & Richard Gilberg
6. Y S Kanetkar, “Let Us C”, BPB Publications

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Computer Laboratory based on Advanced C Programming

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures perWeek
I	B. voc. in Computer Software Development	CSD-204	Major Mandatory (MJM)(P)	Practical on Advanced C	2 (1 Credit = 30 Hours of Lab Work)	5

Objectives of the Course:

1. To learn advanced features in C Programming.
2. To understand code organization with complex data types and structures.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : Implement the concept of Structure and Union.
CO 2 : Implement problem solving skills using pointer concept of the programming languages.
CO 3 : Implement File Handling .
CO 4 : Understand concept of preprocessor.

Guidelines for student Journal:

- The laboratory assignments are to be submitted by student in the form of journal.
- Journal consists of Certificate, table of contents, and handwritten write-up for each assignment.
- Write-up shall include Title, Problem Statement, software and Hardware requirements, Date of Completion.
- Program codes with sample output of all performed assignments are to be submitted as softcopy.
- Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be retained with program prints.

Guidelines for Assessment:

- Continuous assessment of laboratory work is to be carried out based on overall performanceof students.
- For each lab assignment, the instructor will assign grade/marks based on parameters such as timely completion, understanding, neatness etc. with appropriate

Topics and Learning Points

Unit	Title of Assignment	No. of Lectures (Per Lecturein Clock Hours)
1	Assignment 01:- Use of Pointers & Dynamic Memory Allocation	8
2	Assignment 02:- String Handling	8
3	Assignment 03:- Structures and Unions	8
4	Assignment 04:- File Handling , Command Line Arguments and Pre-processor Directives	6

References:

1. Cormen, Leiserson, Rivest, Stein, “Introduction to algorithms”
2. Brian W. Kernighan, Dennis M. Ritchie , “The C Programming Language”,
3. Behrouz A. Forouzan, RichardF. Gilberg, “A Structured Programming ApproachUsing C”
4. E. Balaguruswamy, “Programming in ANSI C”, ISBN: 9781259004612, Tata Mc-GrawHill Publishing Co Ltd.-New Delhi
5. Maureen Spankle, “Problem Solving and Programming Concepts”, ISBN: 81-317-0711-3
6. Y S Kanetkar, “Let Us C”, BPB Publications

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Data Base Management System

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-205	Major Mandatory (MJM)(T)	Data Base Management System(DBMS)	2	3

Objectives of the Course:

1. Understand the basic concepts and the applications of database systems.
2. Master the basics of SQL and construct queries using SQL.
3. Understand the relational database design principles.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : Produces an Entity-Relationship model from a realistic problem specification.

CO 2 : Describes the conceptual and physical schema of a database.

CO 3 : Create and manage database with all integrity constraints.

CO 4 : Develop creative and innovative ideas that could positively shape the organizations.

Topics and Learning Points

TopicNo	Topic Name	Sub Topic	No. of Periods
1	**Introduction to Databases Management and Data Models**	1.1 Introduction 1.2 Application Of DBMS 1.3 Advantages of DBMS 1.4 Users of DBMS 1.4.1 Database Designers 1.4.2 Application Programmer 1.4.3 Sophisticated Users 1.4.5 End Users 1.5 Views of Data 1.6 Data Models 1.6.1 Relational Model 1.6.2 Network Model 1.6.3. Hierarchical Model 1.7 Entity Relationship Diagram (ERD) 1.8 Features of ERD 1.9 Cases Studies on ER Model 1.10 Introduction to Relational Model 1.11 Basic Concepts: Relation, tuple, attribute 1.12 Key: Super Key, Candidate Key, Primary Key, Foreign Key	8
	Relational Model	2.1 Introduction 2.2 Terms a. Relation b. Tuple c. Attribute d. Cordinality e. Degree of relationship set	06

		f. Domain 2.3 Keys 2.3.1 Super Key 2.3.2 Candidate Key 2.3.3 Primary Key 2.3.4 Foreign Key 2.4 Relational Algebra Operations a. Select b. Project	
3	**SQL (Structured Query Language)**	3.1 Introduction 3.2 History Of SQL 3.3 Basic Structure 3.4 DDL Commands 3.5 DML Commands 3.6 Simple Queries 3.7 Nested Queries 3.8 Aggregate Functions	06
4	**Relational Database Design**	4.1 Introduction 4.2 Anomalies of un normalized database 4.3 Normalization 4.4 Normal Form 4.4.1 1 NF 4.4.2 2 NF 4.4.3 3 NF 4.4.4 BCNF	

References:

1) Database System Concepts by Henry Korth and A. Silberschatz
2) SQL, PL/SQL The Programming Language Oracle: - Ivan Bayross, BPB Publication.
3) Database Systems Concepts, Designs and Application by Shio Kumar Singh, Pearson
4) Introduction to SQL by Reck F. van der Lans by Pearson

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Practical on DBMS

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-206	Major Mandatory (MJM)(P)	Practical on Data Base Management System(DBMS)	2	5

Course Objectives:

1. **To make students understand the concept of Database Management System**
2. **To develop Database application**

Course Outcomes:-

CO1: Run SQL statements/queries on a DBMS.

CO2: Identify and use the processes and terminology used in designing a Relational Database Management System (DBMS).

CO3:Design a Database Management System (DBMS) from a given scenario.

CO4: To understand the basic concepts and the applications of database systems.

Unit	Topic	No. of Practicals
1	**Assignment 1:** Table Creation	2
2	**Assignment 2:** DDL Commands	2
3	**Assignment 3 :** DML Commands	2
4	**Assignment 4 :** Table Creation with Constraints	2
5	**Assignment 5 :** Implementation of select Command	2
Total		**10**

B.Voc. in Computer Software Development

As per NEP -2020

Subject: -Business Mathematics

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-207	SEC (T)	Business Mathematics	2	3

Objectives of the Course:

1. To provide solid Mathematical Foundation for Students in Business and Finance.
2. To help the students for various mathematical topics with Practical Business Application.
3. To enhance problem – solving Skills and ability for Academic and Professional Success.
4. To foster conceptual Clarity and Confidence in Mathematical Competence.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : Understand the Concepts of Ratio, Proportion, Percentage and Partnership.

CO 2 : Apply the mathematical concepts to solve real-world financial problems.

CO 3 : Apply the simple and compound interest for various financial instruments.

CO 4 : Analyze models related to Finance and can solve them

Topics and Learning Points

TopicNo	Topic Name	Sub Topic	No. of Periods
1	**Ratio, Proportion, Percentage**	1.1 Introduction to Ratios and Proportions, Applications of Ratios and Proportions, Percent- ages and its applications. 1.2 Concept of Commission and Brokerage, Types of Commission, Partnership, Practical applications.	15
2	**Interest and Dividend**	2.1 Simple interest and compound Interest. 2.2 Equated Monthly Instalments (EMI), EMI on reducing balance, EMI on at and floating rate of interest. 2.3 Concept of shares and dividends, Types of Shares, Problems on dividend and return on investment on shares.	15

References:

1. Practical Business Mathematics by S. A. Bari, New Literature Publishing Company, New Delhi, India.
2. Mathematics for Commerce by K. Selvakumar, Notion Press, Chennai, India.
3. Business Mathematics with Applications by Dinesh Khattar and S. R. Arora, S. Chand Publishing, New Delhi, India.
4. Fundamentals of Business Mathematics by M. K. Bhowal, Asian Books Pvt. Ltd, New Delhi.
5. Business Mathematics by D.C. Sancheti and V. K. Kapoor, Sultan Chand and Sons. 6. Business Mathematics by J. K. Singh, Himalaya Publishing House.

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Business Communication Skills –II

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-208	**Ability Enhancement Course (AEC)**	Business Communication Skills-II	2	3

Objectives of the Course:

1. To enrich communicative competence among students and thereby linguistic competence
2. To inculcate human values and social awareness through the literary pieces
3. To expose students to varied cultural experiences through literature
4. To inculcate a sense of cultural diversity through language and literature

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : To introduce basics of soft skills to students

CO 2 : To instill the soft skills like problems solving, empathy, communication style and work style in students

CO 3 : To contribute to their overall personality development by improving their soft skills

CO 4 : To make students more competent and employable through enrichment of soft skills

Topics and Learning Points

TopicNo	Topic Name	Sub Topic	No. of Periods
1	**Introduction to Soft Skills**	1.1 Team building, Leadership and Coordination Skills 1.2 Time Management 1.3 Goal Setting and SWOT Analysis 1.4 Manners, Etiquettes and Ethics 1.5 Effective Listening and Speaking Skills 1.6 Stress Management and Positive Attitude	10
2	**Interview and Interviewing Skills**	2.1 Introduction 2.2 Essential Features of an Interview 2.3 Types of Interview 2.4 Techniques or Guidelines for an Interviewee 2.5 Solution of Common Problems for an Interviewee	10
3	**Resume Writing and Job Application Letters**	3.1 Introduction 3.2 Essential Elements of Bio-data 3.3 Resume Writing 3.4 Curriculum Vitae 3.5 Drafting of Job Application Letter 3.6 Samples and Practice	10

References:

1. Business Communication- Dr Saroj Hiremath
2. Business Communication- Dr. Dhiraj Zalte
3. Literary Pinnacles- Orient Blackswan Publication
4. Literary Landscapes- Orient Blackswan Publication
5. Communication Skills- Vision Publication

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Environmental Awareness-II

Semester No.	Programme Name	Subject Code	Type of Course	Cours eTitle	Credits	Lectures per Week
I	B. voc. in Computer Software Development	CSD-209	Value Education Course (VEC) T	Environmental Awareness-II	2	3

Objectives of the Course:

1. To impact basic knowledge about the environment .
2. To create the awareness about environmental problems.
3. To develop an attitude of concern for the environment.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : To impact basic knowledge about the environment .

CO 2 : To create the awareness about environmental problems.

CO 3 : To develop an attitude of concern for the environment.

CO 4 : Get the complete information about the all legal aspects of environment protection.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Periods
1	**Environmental Pollution**	1.1 Definition 1.2 Causes, Effects And Control Measures Of: 1.2.1 Air Pollution 1.2.2 Water Pollution 1.2.3 Soil Pollution 1.2.4 Marine Pollution 1.2.5 Noise Pollution 1.2.2 Thermal Pollution 1.2.3 Nuclear Hazards 1.3 Solid Waste Management: Causes, Effects And Control Measures Of Urban And Industrial Waste 1.4 Role Of Individuals In Pollution Prevention 1.5 Disaster Management: Floods, Earthquakes, Cyclones, Landslide	10
2	**Social Issues And The Environment**	2.1 From Unsustainable To Sustainable Development 2.2 Urban Problems Related To Energy 2.3 Water Conservation, Rain Water Harvesting, Watershed Management 2.4 Resettlement And Rehabilitation Of People; Its Problems And Concerns. Case Studies 2.5 Environmental Ethics: Issues And Possible Solutions 2.6 Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents And Nuclear Holocaust 2.7 Wasteland Reclamation 2.8 Consumerism And Waste Products	10

		2.9 Environment Protection Act 2.10 Air (Prevention And Control Of Pollution) Act 2.11 Water (Prevention And Control Of Pollution) Act 2.12 Wildlife Protection Act 2.13 Forest Conservation Act	
3	**Human Population And The Environment**	3.1 Population Growth, Variation Among Nations 3.1.1 Global Population Growth 3.2 Population Explosion – Family Welfare Program 3.2.1 Methods Of Sterilization 3.2.2 Urbanization 3.3 Environmental And Human Health 3.3.1 Environmental Health 3.3.2 Climate And Health 3.3.3 Infectious Diseases 3.3.4 Water-Related Diseases 3.3.5 Risks Due To Chemicals In Food 3.3.6 Cancer And Environment 3.4 Human Rights 3.4.1 Equity 3.4.2 Nutrition, Health And Human Rights 3.4.3 Intellectual Property Rights And Community Biodiversity Registers 3.5 Value Education 3.5.1 Environmental Values 3.5.2 Valuing Nature 3.5.3 Valuing Cultures 3.5.4 Social Justice 3.5.5 Human Heritage 3.5.6 Equitable Use Of Resources 3.5.7 Common Property Resources 3.5.8 Ecological Degradation 3.6 Women And Child Welfare 3.7 Role Of Information Technology In Environment And Human Health	10

References:

1. "Environmental Studies "by Erach Bharucha,
2. "An Introduction to Environmental Science "by R. Raja gopalan,
3. "Environmental Science & Engineering "by B. Rajput.

B.Voc. in Computer Software Development

As per NEP -2020

Subject: - Indian Economic Policy-II

Semester No.	Programme Name	Subject Code	Type of Course	Course Title	Credits	Lectures per Week
I	B. voc. in Computer Software Development	OE -151--ECO	Open Elective (OE)(P)	Indian Economic Policy-II	2	3

Objectives of the Course:

1. In the competitive era the curriculum must compensate the resent advancements with its pros and cons.
2. From this point of view, the curriculum of course on Indian Economy, aims at imparting the skill oriented education based on service, industry and agriculture sectors in the economy.

Course Outcome:

By the completion of the course, student will be able to:

CO 1 : Understand the Concept of Developed and Developing Economies and Status of Indian Economy.

CO 2 : Discuss and debate the various aspects of Indian Economy.

CO 3 : Understand Population Structure of India.

CO 4 : Evaluate the performance of Indian Economy

Topics and Learning Points

Topi cNo	Topic Name	Sub Topic	No. of Periods
1	**Population in India**	1.1 – Demographic Profile of India 1.1.1 Size and Growth 1.1.2 Sex Composition 1.1.3 Age Composition 1.1.4 Density of Population 1.1.5 Rural-Urban Distribution 1.2. – Occupational Distribution of Indian Population 1.3 – Population as a Human Capital for Economic Development 1.4 – Population Control Policy in India 1. 5 - Poverty 1.5.1 - Meaning and Types of Poverty 1.5.2 - Poverty line : Need of Redefining 1.5.3 - Causes of Poverty in India 1.5.4 - Measures to Eradicate Poverty in India	06

2	**Study of Demographic Structure of a Village / Ward in respect of**	2.1- Sex Composition 2.2 - Age Composition 2.3 - Density 2.4 - Literacy Rate 2.5 - Birth and Death Rate 2.6 - Infant Mortality Rate 2.7 - Life Expectancy 2.8 - Per-Capita Income 2.9 – Status of Poverty 2.10 - Status of Poverty line	08

References:

1.Agrawal A.N., Indian Economy Problems of Development & Planning, New Age International Publishers, New Delhi.
2. Gaurav Datt & Ashwani Mahajan (2022): 'Indian Economy' S. Chand Publishing Company Ltd., New Delhi.
3. V.K. Puri, S.K. Misra, 'Indian Economy', Himalaya Publishing House, Mumbai. (Latest Edition)

Teaching Methodology
The Teacher can use the following Methods as Teaching Methodology: 9. Class Room Lectures 10. Guest Lectures of Professionals, Industry Experts etc. 11. Teaching with the help of ICT tools 12. Visits to various Professionals Units, Companies and Business / Industry Units 13. Group Discussion / Debates 14. Assignments, Tutorials, Presentations, Role Play etc. 15. YouTube Lectures developed by MHRD, UGC, Government of Maharashtra, University etc. 16. Analysis of Case Studies

Scheme of Examination		
Scheme of Examination: 1. Internal Assessment: 30% and 2. External Assessment: 70%		
Scheme of Examination	**Exam Format**	**Min. PassingMarks**
Continuous Internal Evaluation (CIE) (15 Marks)	The colleges need to adopt any Two Methods out of the following Methods for Continuous Internal Evaluation: 1) Offline Written Examination 2) Power Point Presentations 3) Assignments / Tutorials 4) Oral Examination 5) Open Book Test 6) Offline MCQ Test 7) Group Discussion 8) Analysis of Case Studies	Min. 06 Marks (40% of Passing)
SEE / ExternalExam (35 Marks) (Total 2 Hours Duration)	***Instructions:*** *1) All Questions are Compulsory.* *2) Attempt any 5 Questions from Question No. 2* *3) Attempt any 4 Questions from Question No. 3* Q. 1: Fill in the Blanks = 05 Marks Q. 2: Short Answer Questions = 10 Marks Q. 3: Long Answer Questions = 20 Marks	Min. 14 Marks (40% of Passing)
Total 50 Marks **Separate Passing for Internal Assessment (CIE) and External Exam (SEE)**		