

**Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur - 440033**



Bachelor of Science (Computer Science)

**Credit Structure, Scheme and Syllabus
[NEP-2020, 3-2-1 Pattern]**

Session 2026-2027 onwards

Submitted by

Board of Studies (Computer Science)

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Level: 4.5 (First Year) Semester: I

Course Type	Course Category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Subject-1	DSC	BCS1DSC01T	Programming in C Paper 1 (Theory)	2	2	20	30	50
	DSC	BCS1DSC01P	Programming in C Paper 1 (Practical)	2	4	20	30	50
Subject-2	DSC		Subject 2 Paper 1 (Theory)	2	2	20	30	50
	DSC		Subject 2 Paper 1 (Practical)	2	4	20	30	50
Subject-3	DSC		Subject 3 Paper 1 (Theory)	2	2	20	30	50
	DSC		Subject 3 Paper 1 (Practical)	2	4	20	30	50
GE/OE_1	GE/OE	BCS1GOE01T	Computer Fundamentals (Theory) For other faculty students [Refer GE/OE basket]	2	2	20	30	50
SEC_1	SEC	BCS1SEC01P	Office Automation (Practical) [Refer SEC basket]	2	4	20	30	50
IKS_1	IKS	B1IKS01T	IKS-Generic (Theory)	2	2	20	30	50
Language	AEC	BS1AEC01T	Compulsory English (Theory)	2	2	20	30	50
VEC_1	VEC	B1VEC01T	Environmental Science (Theory)	2	2	20	30	50
Total				22	30	220	330	550

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Level: 4.5 (First Year)

Semester: II

Course Type	Course Category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Subject-1	DSC	BCS2DSC02T	Object Oriented Programming using C++ Paper 2 (Theory)	2	2	20	30	50
	DSC	BCS2DSC02P	Object Oriented Programming using C++ Paper 2 (Practical)	2	4	20	30	50
Subject-2	DSC		Subject 2 Paper 2 (Theory)	2	2	20	30	50
	DSC		Subject 2 Paper 2 (Practical)	2	4	20	30	50
Subject-3	DSC		Subject 3 Paper 2 (Theory)	2	2	20	30	50
	DSC		Subject 3 Paper 2 (Practical)	2	4	20	30	50
GE/OE_2	GE/OE	BCS2GOE02T	Office Automation (Theory) For other faculty students [Refer GE/OE basket]	2	2	20	30	50
SEC_2	SEC	BCS2SEC02P	Data Visualization (Practical) [Refer SEC basket]	2	4	20	30	50
Language	AEC	BS2AEC02T	Second Language (Theory)	2	2	20	30	50
VEC_2	VEC	B2VEC02T	Constitution of India (Theory)	2	2	20	30	50
CC_1	CC	BS2CC01P	Co-Curricular (Practical) [Refer CC basket]	2	4	50	---	50
Total				22	32	250	300	550

Exit Option: Award of Certificate in Major with 44 credits and an additional 4 credits core NSQF Course/Internship or continue with major and minor.

Continue Options: Student will select one subject among the (Subject-1, Subject-2, and Subject-3) as major and another as minor and third subject will be dropped.

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Level: 5.0 (Second Year) Semester: III

Course Type	Course Category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS3DSC03T	Data Structures Paper 3 (Theory)	2	2	20	30	50
	DSC	BCS3DSC04T	Operating System and Linux Paper 4 (Theory)	2	2	20	30	50
	DSC	BCS3DSC03P	Practical based on Paper 3 and Paper 4 (Practical)	2	4	20	30	50
	VSC	BCS3VSC01P	Web Design Using HTML and DHTML (Practical)	2	4	20	30	50
	FP	BCS3FP01P	Major Specific (Practical)	2	4	50	---	50
Minor	Minor	BCS3MN03T	Programming in JAVA Paper 3 (Theory)	2	2	20	30	50
	Minor	BCS3MN03P	Programming in JAVA Paper 3 (Practical)	2	4	20	30	50
GE/OE_3	GE/OE	BCS3GOE03T	E- Commerce (Theory) For other faculty students [Refer GE/OE basket]	2	2	20	30	50
IKS_2	IKS	BCS3IKS02T	Major Specific (Theory)	2	2	20	30	50
Language	AEC	BS3AEC03T	Second Language (Theory)	2	2	20	30	50
CC_2	CC	BS3CC02P	Co-Curricular (Practical) [Refer CC basket]	2	4	50	---	50
Total				22	32	280	270	550

Level: 5.0 (Second Year) Semester: IV

Course Type	Course Category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS4DSC05T	Java Programming Paper 5 (Theory)	2	2	20	30	50
	DSC	BCS4DSC06T	Database Management System Paper 6 (Theory)	2	2	20	30	50
	DSC	BCS4DSC04P	Practical based on Paper 5 and Paper 6 (Practical)	2	4	20	30	50
	VSC	BCS4VSC02P	Computer Animation (Practical)	2	4	20	30	50
	CEP	BCS4CEP01P	Community Engagement Program (Practical)	2	4	50	---	50
Minor	Minor	BCS4MN04T	PostgreSQL Paper 4 (Theory)	2	2	20	30	50
	Minor	BCS4MN04P	PostgreSQL Paper 4 (Practical)	2	4	20	30	50
GE/OE_4	GE/OE	BCS4GOE04T	Digital Marketing (Theory) For other faculty students [Refer GE/OE basket]	2	2	20	30	50
SEC_3	SEC	BCS4SEC03P	SQL and PL/SQL (Practical) [Refer SEC basket]	2	4	20	30	50
Language	AEC	BS4AEC04T	Compulsory English (Theory)	2	2	20	30	50
CC_3	CC	BS4CC03P	Co-Curricular (Practical) [Refer CC basket]	2	4	50	---	50
Total				22	34	280	270	550

Exit Option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits in core NSQF Course/Internship or continue with major and minor.





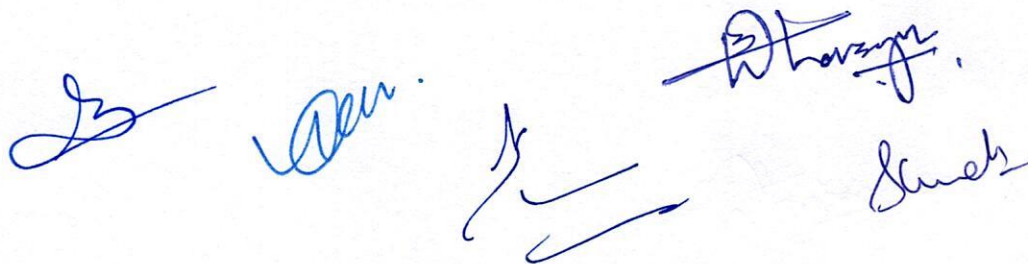

Level: 5.5 (Third Year) Semester: V

Course Type	Course category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS5DSC07T	Advanced Java Programming Paper 7 (Theory)	2	2	20	30	50
	DSC	BCS5DSC08T	Software Engineering Paper 8 (Theory)	2	2	20	30	50
	DSC	BCS5DSC09T	Python Programming Paper 9 (Theory)	2	2	20	30	50
	DSC	BCS5DSC10T	Compiler Construction Paper 10 (Theory)	2	2	20	30	50
	DSC	BCS5DSC05P	Practical based on Paper- 7 and 8 (Practical)	2	4	20	30	50
	DSC	BCS5DSC06P	Practical based on Paper- 9 and 10 (Practical)	2	4	20	30	50
	DSE	BCS5DSE01AT BCS5DSE01BT	A. Open Source Programming using PHP (Theory) OR B. Data Mining (Theory)	2	2	20	30	50
	DSE	BCS5DSE01P	A. Open Source Programming using PHP (Practical) OR B. Data Mining (Practical)	2	4	20	30	50
	VSC	BCS5VSC03P	Multimedia Editing (Practical)	2	4	20	30	50
	CEP	BCS5CEP02P	Community Engagement Program (Practical)	2	4	50	---	50
Minor	Minor	BCS5MN05T	Cyber Forensics Paper 5 (Theory)	2	2	20	30	50
Total				22	32	250	300	550

Level: 5.5 (Third Year) Semester: VI

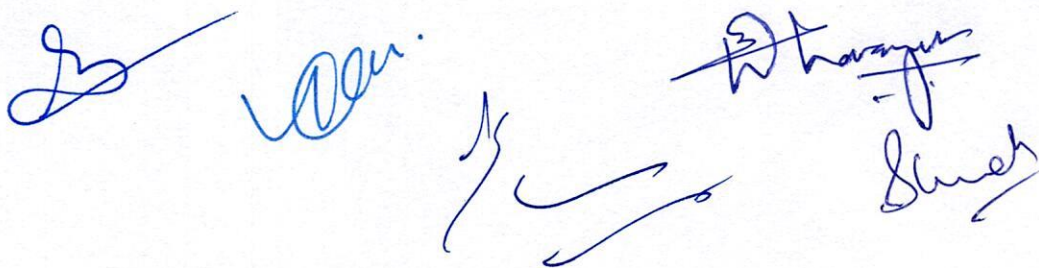
Course Type	Course category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS6DSC11T	Artificial Intelligence Paper 11 (Theory)	2	2	20	30	50
	DSC	BCS6DSC12T	Data Communication and Networks Paper 12 (Theory)	2	2	20	30	50
	DSC	BCS6DSC13T	ASP .NET Paper 13 (Theory)	2	2	20	30	50
	DSC	BCS6DSC14T	Cyber Security Paper 14 (Theory)	2	2	20	30	50
	DSC	BCS6DSC07P	Practical based on Paper- 11 and 12 (Practical)	2	4	20	30	50
	DSC	BCS6DSC08P	Practical based on Paper- 13 and 14 (Practical)	2	4	20	30	50
	DSE	BCS6DSE02AT BCS6DSE02BT	A. Computer Graphics (Theory) OR B. Neural Network (Theory)	2	2	20	30	50
	DSE	BCS6DSE02P	A. Computer Graphics (Practical) OR B. Neural Network (Practical)	2	4	20	30	50
	VSC	BCS6VSC04P	Shell Programming (Practical)	2	4	20	30	50
	OJT	BCS6OJT01P	Major Specific (Practical)	4	8	40	60	100
Total				22	34	220	330	550

Exit Option: Award of UG Degree in Major with 132 credits or continue with major and minor.



Level: 6.0 (Fourth Year) Semester: VII (Honors)

Course Type	Course category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS7DSC15T	Machine Learning Paper 15 (Theory)	2	2	20	30	50
	DSC	BCS7DSC16T	Cloud Computing Paper 16 (Theory)	2	2	20	30	50
	DSC	BCS7DSC17T	R Programming Paper 17 (Theory)	2	2	20	30	50
	DSC	BCS7DSC18T	Introduction to Data Science 18 (Theory)	2	2	20	30	50
	DSC	BCS7DSC19T	Internet of Things Paper 19 (Theory)	2	2	20	30	50
	DSC	BCS7DSC09P	Practical based on Paper -15 and 16 (Practical)	2	4	20	30	50
	DSC	BCS7DSC10P	Practical based on Paper-17 to 19 (Practical)	2	4	20	30	50
	DSE	BCS7DSE03AT OR BCS7DSE03BT	A. Soft Computing (Theory) OR B. Natural Language Processing (Theory)	2	2	20	30	50
	DSE	BCS7DSE03P	A. Soft Computing (Practical) OR B. Natural Language Processing (Practical)	2	4	20	30	50
	RM	BCS7RM01T	Research Methodology (Theory)	2	2	20	30	50
	RM	BCS7RM01P	Research Methodology (Practical)	2	4	20	30	50
Total				22	30	220	330	550

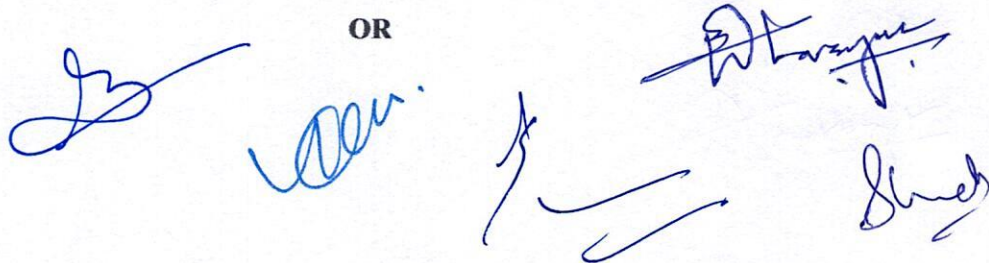


Level: 6.0 (Fourth Year) Semester: VIII (Honors)

Course Type	Course Category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS8DSC20T	BigData Analytics Paper 20 (Theory)	2	2	20	30	50
	DSC	BCS8DSC21T	Deep Learning Paper 21 (Theory)	2	2	20	30	50
	DSC	BCS8DSC22T	Digital Image Processing Paper 22 (Theory)	2	2	20	30	50
	DSC	BCS8DSC23T	Android Programming Paper 23 (Theory)	2	2	20	30	50
	DSC	BCS8DSC24T	Generative AI Paper 24 (Theory)	2	2	20	30	50
	DSC	BCS8DSC11P	Practical based on Paper-20 to 22 (Practical)	2	4	20	30	50
	DSC	BCS8DSC12P	Practical based on Paper-23 and 24 (Practical)	2	4	20	30	50
	DSE	BCS8DSE04AT BCS8DSE04BT	A. Sales Force (Theory) OR B. Full Stack Development (Theory)	2	2	20	30	50
	DSE	BCS8DSE04P	A. Sales Force (Practical) OR B. Full Stack Development (Practical)	2	4	20	30	50
	OJT	BCS8OJT02P	Major Specific (Practical)	4	8	40	60	100
Total				22	32	220	330	550

Exit Option: Award of UG Honors Degree in major and minor with 176 credits.

OR



Level: 6.0 (Fourth Year) Semester: VII (Honors with Research)

Course Type	Course Category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS7DSC15T	Machine Learning Paper 15 (Theory)	2	2	20	30	50
	DSC	BCS7DSC16T	Cloud Computing Paper 16 (Theory)	2	2	20	30	50
	DSC	BCS7DSC17T	R Programming Paper 17 (Theory)	2	2	20	30	50
	DSC	BCS7DSC09P	Practical based on Paper-15 and 16 (Practical)	2	4	20	30	50
	DSC	BCS7DSC10P	Practical based on Paper-17 (Practical)	2	4	20	30	50
	DSE	BCS7DSE03AT BCS7DSE03BT	A. Soft Computing (Theory) OR B. Natural Language Processing (Theory)	2	2	20	30	50
	DSE	BCS7DSE03P	A. Soft Computing (Practical) OR B. Natural Language Processing (Practical)	2	4	20	30	50
	RM	BCS7RM01T	Research Methodology (Theory)	2	2	20	30	50
	RM	BCS7RM01P	Research Methodology (Practical)	2	4	20	30	50
	RP	BCS7RP01P	Research Project (Practical)	4	8	40	60	100
Total				22	34	220	330	550

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Level: 6.0 (Fourth Year) Semester: VIII (Honors with Research)

Course Type	Course Category	Course Code	Course Title	Credits	Teaching Scheme Hr/Week	Evaluation Scheme and Max Marks		
						CIE	SEE	Total
Major	DSC	BCS8DSC20T	BigData Analytics Paper 20 (Theory)	2	2	20	30	50
	DSC	BCS8DSC21T	Deep Learning Paper 21 (Theory)	2	2	20	30	50
	DSC	BCS8DSC22T	Digital Image Processing Paper 22 (Theory)	2	2	20	30	50
	DSC	BCS8DSC09P	Practical based on Paper-20 and 21 (Practical)	2	4	20	30	50
	DSC	BCS8DSC10P	Practical based on Paper-22 (Practical)	2	4	20	30	50
	DSE	BCS8DSE04AT BCS8DSE04BT	A. Sales Force (Theory) OR B. Full Stack Development (Theory)	2	2	20	30	50
	DSE	BCS8DSE03P	A. Sales Force (Practical) OR B. Full Stack Development (Practical)	2	4	20	30	50
	RP	BCS8RP02P	Research Project (Practical)	8	16	80	120	200
Total				22	36	220	330	550

Exit Option: Award of UG Honors with Research Degree in major and minor with 176 credits.

Basket for Minor Category Courses (Computer Science)

Semester -III

Category	Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
Minor	BCS3MN03T	Programming in JAVA (Theory)	2	2	20	30	50
Minor	BCS3MN03P	Programming in JAVA (Practical)	2	4	20	30	50

Semester -IV

Minor	BCS4MN04T	PostgreSQL (Theory)	2	2	20	30	50
Minor	BCS4MN04P	PostgreSQL (Practical)	2	4	20	30	50

Semester -V

Minor	BCS5MN05T	Cyber Forensics (Theory)	2	2	20	30	50
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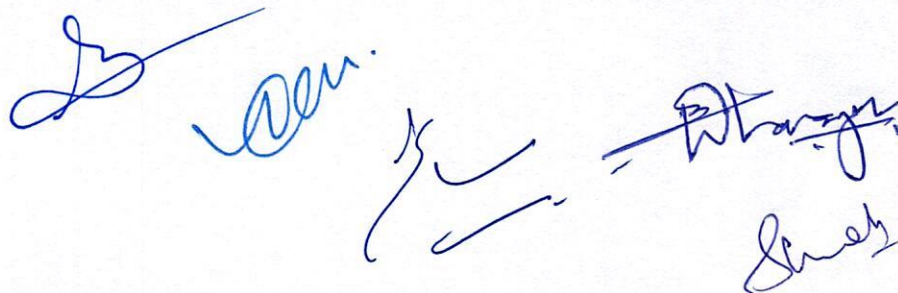
Basket for ELECTIVE (DSE) Category Courses (Computer Science)

Semester -V

Category	Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
DSE	BCS5DSE01AT	A. Open Source Programming using PHP (Theory)	2	2	20	30	50
	BCS5DSE01BT	B. Data Mining (Theory)					
DSE	BCS5DSE01P	A. Open Source Programming using PHP (Practical) OR B. Data Mining (Practical)	2	4	20	30	50

Semester -VI

Category	Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
DSE	BCS6DSE02AT	A. Computer Graphics (Theory)	2	2	20	30	50
	BCS6DSE02BT	B. Neural Network (Theory)					
DSE	BCS6DSE02P	A. Computer Graphics (Practical) OR B. Neural Network (Practical)	2	4	20	30	50



Semester-VII							
Category	Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
DSE	BCS7DSE03AT	A. Soft Computing (Theory)	2	2	20	30	50
	BCS7DSE03BT	OR B. Natural Language Processing (Theory)					
DSE	BCS7DSE03P	A. Soft Computing (Practical) OR B. Natural Language Processing (Practical)	2	4	20	30	50

Semester -VIII							
Category	Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
DSE	BCS8DSE04AT	A. Sales Force (Theory)	2	2	20	30	50
	BCS8DSE04BT	OR B. Full Stack Development (Theory)					
DSE	BCS8DSE04P	A. Sales Force (Practical) OR B. Full Stack Development (Practical)	2	4	20	30	50

Basket for Generic and Open Elective (GE/OE) Category Courses (Computer Science)
(For other faculty students)

Semester-I								
Category		Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
GE/OE_1	GE/OE	BCS1GOE01T	Computer Fundamentals (Theory)	2	2	20	30	50

Semester-II								
GE/OE_2	GE/OE	BCS2GOE02T	Office Automation (Theory)	2	2	20	30	50

Semester -III								
GE/OE_3	GE/OE	BCS3GOE03T	E-Commerce (Theory)	2	2	20	30	50

Semester-IV								
GE/OE_4	GE/OE	BCS4GOE04T	Digital Marketing (Theory)	2	2	20	30	50



Basket for Skill Enhancement Courses (SEC) Category Courses (Computer Science)

Semester-I

Category	Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
SEC-1	BCS1SEC01P	Office Automation (Practical)	2	4	20	30	50

Semester-II

SEC-2	BCS2SEC02P	Data Visualization (Practical)	2	4	20	30	50
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Semester-IV

SEC-3	BCS4SEC03P	SQL and PL/SQL (Practical)	2	4	20	30	50
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Basket for Vocational and Skill Courses (VSC) Category Courses (Computer Science)

Semester-III

Category	Course Code	Subject	Credits	Teaching Scheme Hr/Week	CIE	SEE	Total
VSC-1	BCS3VSC01P	Web Design Using HTML and DHTML (Practical)	2	4	20	30	50

Semester-IV

VSC-2	BCS4VSC02P	Computer Animation (Practical)	2	4	20	30	50
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Semester-V

VSC-3	BCS5VSC03P	Multimedia Editing (Practical)	2	4	20	30	50
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Semester-VI

VSC-4	BCS6VSC04P	Shell Programming (Practical)	2	4	20	30	50
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B. Sc. Computer Science (Honors/Research)

A Four-Year Bachelor's Degree Programme

1. Introduction to the Four-Year Bachelor's Degree Programme B. Sc. Computer Science:

The Four-Year Bachelor's Degree Programme is a comprehensive undergraduate education system designed to provide students with in-depth knowledge, practical skills, research exposure and multidisciplinary learning opportunities. The programme aims to develop intellectual competence, critical thinking, creativity, communication skills and professional ethics among students.

Aligned with the objectives of the National Education Policy (NEP) 2020, the four-year bachelor's programme offers flexibility in curriculum design, allowing students to explore subjects across various disciplines while specializing in their chosen field of study. The programme integrates theoretical learning with practical applications, project work, internships and research activities to enhance employability and prepare students for higher education and professional careers.

The curriculum is structured to promote holistic development by incorporating core courses, elective courses, skill enhancement courses, value-added courses and experiential learning components. Students are encouraged to engage in innovation, entrepreneurship, community service and lifelong learning.

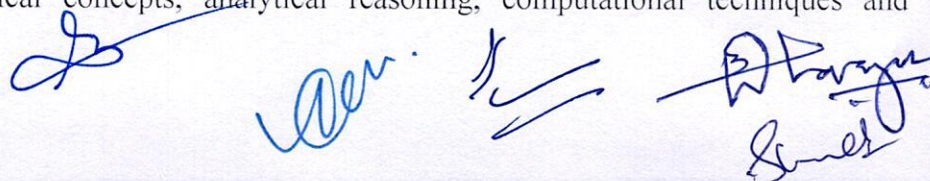
Upon successful completion of the programme, graduates will possess subject-specific expertise, analytical abilities, problem-solving skills, leadership qualities and a strong foundation for pursuing advanced studies, research or diverse career opportunities in their respective fields.

Programme Duration and Design: The B.Sc. (Honors/Res) Computer Science course is a eight semester course spread over four academic years. The teaching – learning process involves theory and practical classes and will be student-centred. Apart from the conventional chalk and talk method, power point presentations, audio–video tools, class discussions, simulations and virtual labs (wherever possible) will be used. Students will be encouraged to carry out short term projects and participate in industrial and institutional visits, seminars and workshops. Assessment will be based on continuous internal evaluation (CIE) and semester end examination (SEE). Each theory paper will be of 50 marks out of which 40% marks are for internal assessment. Practical paper will also be of 50 marks comprising 40% internal assessment. Minimum passing in each head (i.e. CIE and SEE) will be 40%

2. Learning Outcome-Based Curriculum Framework (LOCF) for B.Sc. (Honours/Research) in Computer Science

Introduction

The Learning Outcome-Based Curriculum Framework (LOCF) for the Bachelor of Science (Honours/Research) in Computer Science is designed to provide students with a strong foundation in mathematical concepts, analytical reasoning, computational techniques and



research methodologies. The programme aims to develop logical thinking, problem-solving abilities and quantitative skills that are essential for higher studies, research and professional careers in science, technology, finance, education and related fields.

The curriculum follows the principles of the National Education Policy (NEP) 2020 and emphasizes student-centered learning, multidisciplinary education, skill development and research orientation. It integrates theoretical knowledge with practical applications through projects, seminars, internships, computational activities and research-based learning.

Nature and Extent: The B.Sc. (Honors/Research) Computer Science programme enables students to acquire a comprehensive understanding of core areas of computer science such as Numerical Methods, Probability and Statistics and Computer Science in physical sciences, data analytics, economics engineering, emerging technology and novel network.

Aims of the Programme: The Honours/Research track provides opportunities for advanced study and independent research, enabling students to undertake research projects, develop scientific inquiry skills and contribute to the creation of new knowledge. It equips students with vital cognitive and practical skills beyond coding, it foster computational thinking and logical problem solving. It prepares students for a rapidly evolving digital economy, shaping analytical abilities and future career readiness across all disciplines. Upon completion of the programme, graduates will possess the critical thinking abilities, computational proficiency, communication skills and ethical values necessary for successful careers and lifelong learning.

Programme Specific Outcomes (PSOs)

After successful completion of the B.Sc. (Honours/Research) in Computer Science programme, students will be able to:

1. Demonstrate comprehensive knowledge of fundamental and advanced concepts in computer science.
2. Apply techniques to solve theoretical and real-world problems.
3. Analyze, interpret, and evaluate computational arguments and proofs logically.
4. Use computational tools and mathematical software for modeling, simulation, and data analysis.
5. Formulate and solve problems using appropriate methods and techniques.
6. Conduct independent research and findings effectively.
7. Integrate computational knowledge with interdisciplinary applications.
8. Demonstrate critical thinking, creativity and innovation in addressing complex challenges.
9. Exhibit professional ethics, social responsibility and lifelong learning skills.
10. Pursue higher education, research, entrepreneurship and diverse career opportunities in mathematics and allied disciplines.



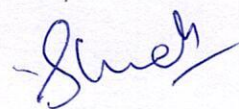
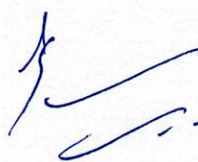
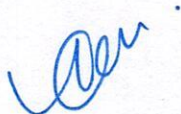
Graduate Attributes

The programme seeks to develop:

- Disciplinary Knowledge
- Critical and Analytical Thinking
- Problem-Solving Skills
- Research Competence
- Digital and Computational Literacy
- Effective Communication Skills
- Teamwork and Leadership
- Ethical and Professional Values
- Lifelong Learning Abilities
- Social and Environmental Responsibility

2. Structure of the Programme in B.Sc. (Honors/Research) Computer Science:

The programme includes Core Courses and Elective Courses. The Discipline Specific Core (DSC) Courses are all compulsory courses. There are three types of Elective Courses – Discipline Specific Elective (DSE), Generic Elective (GE), Vocational/ Skill Enhancement Courses (VSC). In addition there are Ability Enhancement Courses (AEC). Field based projects (FP) and research projects add to the skill component.



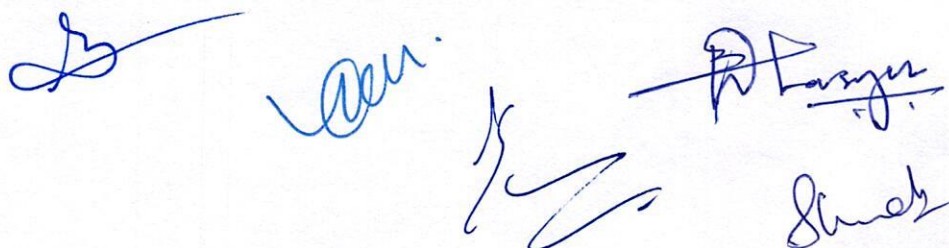
Question Paper Pattern and Scheme to evaluate Semester End Examination (SEE) & Continuous Internal Evaluation (CIE) of Four-Year Under Graduate (U.G.) Programme as per NEP-2020 (3-2-1 Pattern)

B.Sc. (Honors/Research) (Major – Computer Science)

Instructions to the Paper Setters

The duration of university theory semester end examination shall be of *Three Hours*.

1. The Question Paper shall consist of total ***Five*** questions (long answer/proof type and short answer/proof type sub questions) and each question carry equal marks (06) out of total maximum 30 marks. Out of these Five, there shall be Four questions on four units with ***open choice*** from the same unit and one question based on all four units.
2. The question paper should be set based on the Course Outcomes (COs) defined in the curriculum and ensure that all the outcomes are addressed through appropriate questions.
3. Read and study the COs of a paper/subject/course very carefully.
4. The questions should help to measure attainment of their corresponding COs as prescribed in the syllabus/curriculum. All questions must be mapped to their related COs.
5. Questions paper should try to address the different levels of learning i.e. Knowledge / Remembering, Understanding, Applying, Analysing, Evaluating and Creating.
6. All Units mentioned in the course (Paper) should be covered with equal weightage. The question paper shall be set so as to cover the entire syllabus of the respective course (Paper).
7. The degree of difficulty of the question paper should be such that a student, who has engaged himself in the continuous learning process should be able to clear with ease. However, for scoring further his all-round knowledge and skills should be tested.
8. Important note: There is separate passing of 40% in both theory and practical including CIE & SEE.
9. Follow the following question pattern while setting question papers:



**Question Paper Pattern for Theory Semester End Examination (SEE) For DSC, DSE, Minor, IKS
(Theory Papers)**

- **Theory Paper:** Maximum Marks: *30 (Thirty)*. Duration of Examination: *Three Hours*.
- Layout of the model question paper:

Bachelor of Science (B.Sc.) (Computer Science) Semester-I (NEP 3-2-1) Examination

DSC Paper 1: Programming in C
(Discipline Specific Course - 01)

Time: Three Hours

Maximum Marks: 30

- Note:** (1) All the questions are Compulsory.
(2) Each question carries equal marks.
(3) Draw neat and well labelled diagram wherever necessary.

Unit-I		
Q.1(A)	Long Answer Question	3
Q.1(B)	Long Answer Question	3
	OR	
Q.1(C)	Long Answer Question	3
Q.1(D)	Short Answer Question	3
Unit-II		
Q.2(A)	Long Answer Question	3
Q.2(B)	Long Answer Question	3
	OR	
Q.2(C)	Long Answer Question	3
Q.2(D)	Short Answer Question	3
Unit-III		
Q.3(A)	Long Answer Question	3
Q.3(B)	Long Answer Question	3
	OR	
Q.3(C)	Long Answer Question	3
Q.3(D)	Short Answer Question	3
Unit-IV		
Q.4(A)	Long Answer Question	3
Q.4(B)	Long Answer Question	3
	OR	
Q.4(C)	Long Answer Question	3
Q.4(D)	Short Answer Question	3
Question V		
Q.5	Attempt any SIX Short Answer Question from the following:	
(A)	From Unit I	1
(B)	From Unit I	1
(C)	From Unit II	1
(D)	From Unit II	1
(E)	From Unit III	1
(F)	From Unit III	1
(G)	From Unit IV	1
(H)	From Unit IV	1

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B. Sc. Semester I (Computer Science) PROGRAMMING IN C (Paper 1)			
DSC-1 Theory	Hours: 02 Hours/Week Course Code: BCS1DSC01T	Maximum Marks: (CIE + SEE = Total) 20 + 30 = 50	Credit 02
Course Outcomes: After completing this course satisfactorily, a student will be able to: 1. Apply simple algorithms for arithmetic and logical problems. 2. Implement conditional branching and iteration. 3. Divide complex tasks into reusable user define functions and handle recursion. 4. Analyze the use of pointers, structures, union and implement dynamic allocation.			
UNIT I Programming Structure: Sequence, Selection, Iteration and Modular. Problem Solving techniques: Development Tools: Algorithm, Flowcharts and Pseudo code (Definition and its characteristics) Developing Algorithm and Drawing flowcharts.			
UNIT II C Character set, Tokens: Identifier, Keywords, Variables, Data types, Qualifiers. Operators and Expressions: Arithmetic, Relational, Logical, Bit-Wise, Increment, Decrement, Conditional and Special operators. typedef, Type Conversion, Constants, Declaring Symbolic Constants, Character Strings, Enumerated Data Types, Operator Precedence and Associativity. Library functions: Maths, string handling Functions. Control Structure: Compound Statement, Selection Statement: if, if-else, Nested if, switch. Iteration statement: for, while, do...while, Nested loops, Jump statements: break, continue, goto (Special emphasis on problem solving)			
UNIT III Arrays: Need, Types, Single and Two Dimensional Array. Strings: Strings Manipulation, Arrays of Strings, Evaluation order. Function: Function Components, Return Data type, Parameter Passing, Return by Reference, Default Arguments, Recursive Functions, Arrays with Functions, Storage Classes. (Special emphasis on problem Solving)			
UNIT IV Structure: Declaration, Definition, Accessing structure members, Initialization, Nesting of Structures. Union: Union, Differences between Structure and Union. Pointer: Introduction, Address Operator (&), Pointer variables, void pointers, Pointer Arithmetic, Pointers to Pointers. File handling: Introduction, Opening & closing a file, Testing for errors, File Modes, File pointers and their manipulations, Sequential Access, Random Access, Command Line arguments.			
Text Books 1. Programming in C by E. Balagurusamy TMH Publications. 2. Let us 'C' by Yashwant Kanetkar, BPB Publication. 3. The Art of programming through flowcharts & algorithm by Anil B. Chaudhari Firewall Media, Laxmi publication, New Publication.			

B. Sc. Semester I (Computer Science)
PROGRAMMING IN C (Practical)

**DSC-1
Practical**

Hours: 04 Hours/Week

Course Code: BCS1DSC01P

**Maximum Marks:
(CIE + SEE = Total)
20 + 30 = 50**

Credit 02

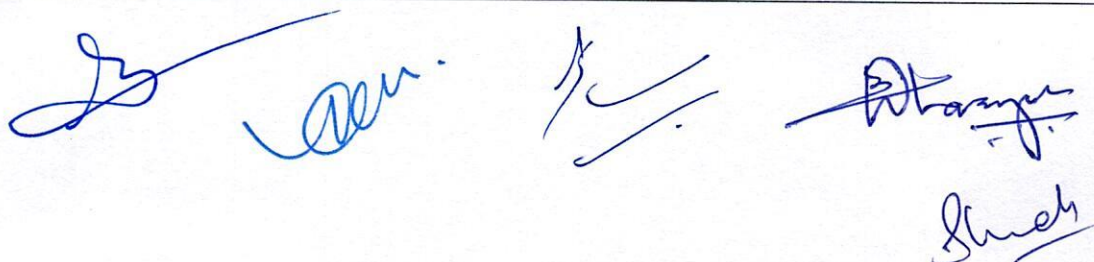
Practical List

1. Write a Program in c to find largest of three numbers.
2. Write a Program in c to print Fibonacci Series up to n terms.
3. Write a Program in c to find if a number is prime or not.
4. Write a Program in c to find sum of digits of any entered number.
5. Write a Program in c to find frequency of occurrence of a given number from array of N elements.
6. Write a Program in c to insert an element in one dimensional Array at a given position.
7. Write a Program in c to delete an element from one dimensional array.
8. Write a Program in c to search the element in an array of N elements using Linear Search method.
9. Write a Program in c to find largest element in Two Dimensional Array's (3*3matrix).
10. Write a Program in c to check if given String is Palindrome or not.
11. Write a Program in c to find Factorial of a number using Recursive function.
12. Write a Program in c using function to find sum of two numbers with no argument and no return values.
13. Write a Program in c using function to find sum of two numbers with argument and no return values.
14. Write a Program in c to swap values of two variables by passing pointers.
15. Write a program in c to demonstrate structure.



B. Sc. Semester I (Computer Science)
GE/OE-1 COMPUTER FUNDAMENTALS

GE/OE-1 Theory	Hours: 02 Hours/Week Course Code: BCS1GOE01T	Maximum Marks: (CIE + SEE = Total) 20 + 30 = 50	Credit 02
Course Outcomes: After completing this course satisfactorily, a student will be able to: 1. Understand the architecture of digital computer, memory hierarchy and language translator. 2. Identify and explain the working principles and applications of input, output, storage devices. 3. Apply number system conversions, perform binary arithmetic and analyze the operation of basic and universal logic gates. 4. Explain computer networking concepts, network topologies, communication devices and internet Protocols.			
UNIT I Basic Components of Digital Computers: Block Diagram. CPU: Functions of Each Unit: Primary Memory, ALU and CU: Fetch and Execution cycle, Execution of Instructions in Single Address CPU. Memory: RAM, ROM, PROM, EPROM, EEPROM and Cache. CISC and RISC Technology Bus: Data, Control and Address Bus, Bus Organization. Language Evolution: Generation of Languages: Machine, Assembly, High Level Languages. Characteristics of Good Language Translators: Compiler, Interpreter and Assembler. Source and Object Program.			
UNIT II Storage Devices: Hard Disk and Optical Disk. Pen Drive, SD Card, Cloud as storage. Input Devices: Keyboard, Mouse, Light Pen, Touch Screen, Voice Input, MICR, OCR, OMR, Barcode Reader and Flatbed Scanner. Output Devices: VDU, Printers: Dot Matrix, Laser and Inkjet. Plotters: Drum, Flat-Bed and Inkjet			
UNIT III Number Systems: Binary, Octal, Decimal, Hexa-Decimal, Their Conversions, Binary Arithmetic. ASCII, BCD, EBCDIC. Logic Gates: Truth table, properties and symbolic representation of NOT, AND, OR, NOR, NAND, EXOR, EXNOR gates. NOR and NAND gates as a universal gate. Binary Arithmetic: Binary addition, binary subtraction using 1's and 2's compliment.			
UNIT IV Network: Network terminology, Topologies: Linear, Circular, Tree and Mesh. Types of Networks: LAN, WAN, MAN. Networking Devices: Repeaters, Bridges, Routers and Gateway. Modem for Communication between pc's, wi-fi network, Introduction of Bluetooth and Infrared devices. Network Architecture: Peer-to-Peer, Client/Server Internet Protocols: TCP/IP, FTP, HTTP, HTTPS, Internet Addressing: IP Address, Domain Name, URL.			
Text Books: 1. Information Technology Concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi.] 2. Fundamentals of Information Technology By Alexis And Mathews Leon [Leon Press, Chennai & Vikas Publishing House Pvt. Ltd, New Delhi] 3. Fundamental of Microprocessor by B Ram			



B. Sc. Semester I (Computer Science)
SEC-1 OFFICE AUTOMATION (Practical)

**SEC-1
Practical**

Hours: 02 Hours/Week

Course Code: BCS1SEC01P

**Maximum Marks:
(CIE + SEE = Total)
20 + 30 = 50**

Credit 02

Practical List

1) Execute the following commands with its definition, syntax and Example

- i) DIR
- ii) Date
- iii) Time

2) **Practical List for WORD:**

i) **Create a telephone directory.**

- The heading should be 16-point Arial Font in bold
- The rest of the document should use 10-point font size
- Other headings should use 10-point Courier New Font.
- The footer should show the page number as well as the date last updated.

3) **Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at image least one surrounded by text.**

4) **XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.**

- (a) The title of the book should appear in bold using 20-point Arial font.
- (b) The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
- (C) At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
- (d) The details of the offices of the publisher (only location) should appear in the footer.

5) a) **Enter the following data into a table given on the next page.**

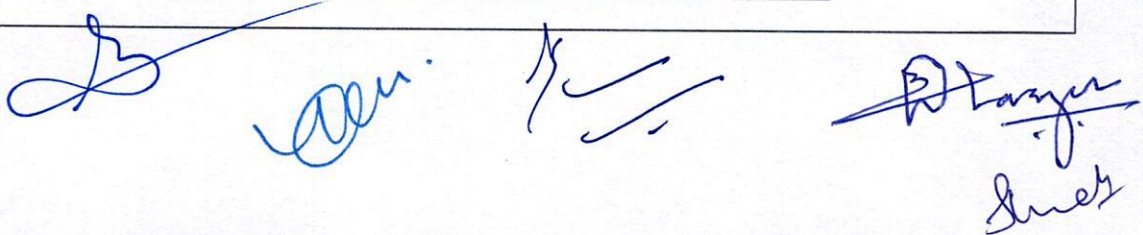
Saleperson	Dolls	Truck	Puzzles
Amit	1327	1423	1193
Shivi	1421	3863	2934
Om	5214	3247	5467
Ananya	2190	1278	1928
Anupama	1201	2528	1203
Maharshi	4098	3079	2067

b) **Create the following Charts/Graphs in MS-Word**

- 1. Bar Chart/Graphs
- 2. Line Chart/Graphs
- 3. Pie Chart/Graphs

6) To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P – V and P-I/V. Sample observations are: -

Pressure(P)	Volume (V)	I/V	PV	P/V



7) Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).

8) Create the following Charts/Graphs in MS-Word

Salesman	2022	2023	2024	2025
MADHAVI	10000	12000	20000	50000
VARSHA	15000	18000	50000	60000
SNEHAL	20000	22000	70000	70000
RAHUL	30000	30000	100000	80000
RAJESH	40000	20000	60000	70000

Apply the following Mathematical & Statistical functions on above Table:

i) Calculate the commission for each salesman under the condition: -

a) If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.

b) Otherwise, 4% of total sale.

ii) Calculate the maximum sale made by each salesman.

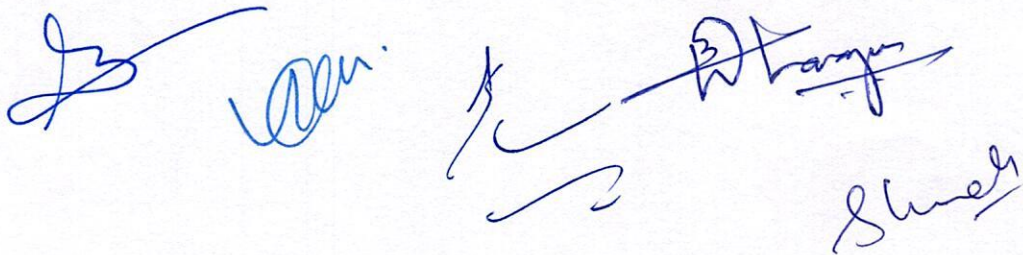
iii) Calculate the maximum sale made in each year.

iv) Also calculate the Mode, Stddev, Variance, Median for the sale made by each

9) Practical List for Power Point:

Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.

10) Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.

The block contains five handwritten signatures in blue ink. From left to right, they appear to be: 'Iz', 'Varsha', 'Rajesh', 'Snehal', and 'Rahul'. The signatures are written in a cursive, flowing style.

B. Sc. Semester II (Computer Science) OBJECT ORIENTED PROGRAMMING USING C++ (Paper 2)			
DSC-2 Theory	Hours: 02 Hours/Week Course Code: BCS2DSC02T	Maximum Marks: (CIE + SEE = Total) 20 + 30 = 50	Credit 02
Course Outcomes: After completion of this course, students will be able to: 1. Realize the need, features of OOP, and idealize how C++ differs from C. 2. Infer knowledge on various types of overloading. 3. Choose suitable inheritance while proposing solution for the given problem. 4. Illustrate application of pointers in virtual functions.			
UNIT I Object Oriented Methodology: Elements of Object Oriented programming, Objects, Classes, OOPs features. Classes & Objects: Specifying a Class, Creating Objects, Accessing Class members, Defining member function, Outside Member Functions as inline, Accessing Member Functions within the class, Static data member, Access specifiers: private, protected and public Members.			
UNIT II Constructors & Destructors: Introduction, Parameterized Constructors, Constructor Overloading, Constructors with Default Arguments, Copy Constructor, Destructor, Order of Construction and Destruction, Static data members with Constructor and Destructors. Operator Overloading: Definition, Overloadable Operators, Unary Operator Overloading, Unary & Binary overloading, Rules for Operators Overloading.			
UNIT III Dynamic Objects: Pointers to Objects, Creating and Deleting Dynamic Objects, New and Delete operators, Array of Objects, Array of Pointers to Objects, Pointers to Object Members, this Pointer. Inheritance: Defining, Abstract classes, Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Constructor and Destructor in Derived Classes.			
UNIT IV Virtual Functions: Need for Virtual Functions, definition, Pure Virtual Functions, Abstract Classes, Rules for Virtual Functions. Exception Handling: Exception Handling Model, List of Exceptions, Handling Uncaught Exceptions, Fault Tolerant Design Techniques, Memory Allocation Failure Exception, Rules for Handling Exception Successfully.			
<u>Text Books</u> 1. Mastering C++ by K R Venugopal Tata McGraw-Hill, New Delhi. 2. The C++ Programming Language –Bjarne Stroustrup 3. Programming with C++ - Ravichandran 4. Programming with C++ - Robert Lafore 5. Object Oriented Programming with C++ by E. Balagurusamy, McGraw Hill			

B. Sc. Semester II (Computer Science)
OBJECT ORIENTED PROGRAMMING USING C++ (Practical)

**DSC-2
Practical**

Hours: 02 Hours/Week

Course Code: BCS2DSC02P

**Maximum Marks:
(CIE + SEE = Total)
20 + 30 = 50**

Credit 02

Practical List

- 1) Program to demonstrate, defining member functions inside outside the class.
- 2) Program to demonstrate, static data members and member functions.
- 3) Demonstrate the usage of Constructor and Destructor.
 Define a class data with data member acct_no, balance containing constructor data to initialize data member and a member function display for output.
- 4) Program to demonstrate usage of a constructor and Destructor function. Declare a class with public data member count. The class containing one constructor and destructor to maintain updated information about active objects i.e. i) No of objects created. ii) No of objects Destroyed.
- 5) Program to accept the distance between city 1st & 2nd, city 2nd & 3rd. calculate the distance between city 1st & 3rd. Define a class road with private data member km, m, d1, d2, d3 containing member function getdata to accept values of d1, d2 and calculate for calculating distance.
- 6) Demonstrate the use of operators overloading (string manipulation: + for concatenation and relational operators for alphabetical comparison).
- 7) In a bank N depositor deposit the amount, write a program to find total amount deposited in the bank. Declare a class deposit with private data member Rupee and Paisa containing member function getdata, putdata.
 i. Use array of objects
 ii. Use Operator '+' overloading.
- 8) Declare class event and accept time of first event and second event and find the difference between 1st and 2nd event. Containing public member function getdata and display with private data member hour, minute, second and total.
 i. Use Operator '-' overloading.
- 9) Program to demonstrate Single Inheritance. Declare a class B and derive publically class D from B.
 i. The class B contains private data member a, public data member b with member function get_ab, get_a, show_a.
 ii. The derived class D contains data member c with member function mul and display.
- 10) Program to demonstrate Multiple Inheritances. Declare class M and N and derive publically class P from M and N.
 i. Declare a class M with protected data member m and public member function get_m.
 ii. Declare a class N with protected data member n containing member function get_n.
 iii. Declare class P containing member function display.
- 11) Program to demonstrate Multilevel Inheritance. Declare a class student and derive publically a class test and derive publically class result from class test.
 i. The class student contains protected data member roll_number with public member functions get_number and put_number.
 ii. The class test containing protected data member sub1, sub2 with public member function get_marks and put_marks.
 iii. The class result contains data member total and public member function display.
- 12) Program to demonstrate Hierarchical Inheritance. Declare a class Side and derive publically class Square from base class side and also derive publically class cube from base

class side.

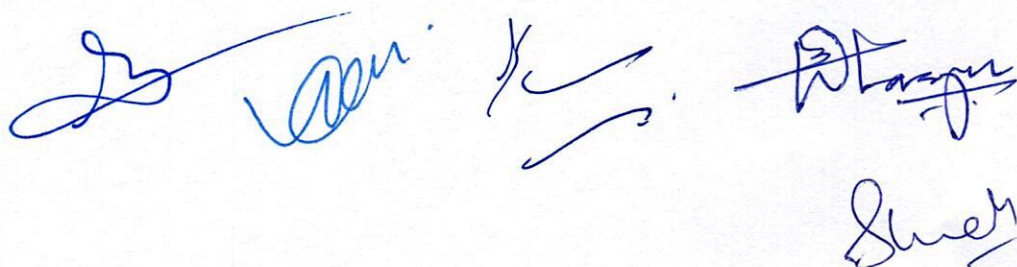
- i. Class Side contains protected data member L with a member function set_values.
 - ii. Class Square contains member function sq.
 - iii. Class Cube contains member function cub.
- 13) Program to demonstrate usage of normal virtual function and pure virtual Function with abstract class.
- 14) Program to determine whether the input is +ve or -ve through exception.
- 15) Program to raise exception if an attempt is made to perform divide-by-zero.

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B. Sc. Semester II (Computer Science) GE/OE-2 OFFICE AUTOMATION			
GE/OE-2 Theory	Hours: 02 Hours/Week Course Code: BCS2GOE02T	Maximum Marks: (CIE + SEE = Total) 20 + 30 = 50	Credit 02
Course Outcomes: After completing this course satisfactorily, a student will be able to: 1. Understand functionality of Operating Systems and its applications. 2. Prepare documents, letters and do necessary formatting of the document. 3. Worksheet creation, inserting and editing data in cells. 4. Opening/saving a presentation and printing of slides and handouts.			
UNIT I Introduction to windows Operating System Advantages of windows operating system, using different windows applications simultaneously, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, my computer, my documents, recycle bin, finding folders and files, changing system settings, system tools, use of run command, setting peripherals, drivers, editing graphics in windows.			
UNIT II Introduction, basics, starting Word, creating document, parts of Word window, mouse and keyboard operations, designing a document; Formatting- selection, cut, copy, paste; Toolbars, operating on text; Printing, saving, opening, closing of document; Creating a template; Tables, borders, pictures, text box operations; Mail Merge.			
UNIT III Introduction to MS EXCEL, navigating, Excel toolbars and operations, Formatting; copying data between worksheets; entering formula, chart creation; data forms, data sort; Functions in Excel ROUND(), SQRT (), MAX(), MIN(), AVERAGE(), COUNT(), SUMIF(), SUMIF(), ABS(), ROMAN(), UPPER(), LOWER(), CELL(), TODAY(), NOW().			
UNIT IV Introduction to MS POWER POINT Working with Power Point Window, Standard Tool Bar, Formatting tool bar, Drawing tool Bar, Moving the Frame, Inserting Clip Art, Picture, Slide, Text Styling, Send to back, Entering data to graph, Organization Chart, Table, Design template, Master Slide, Animation Setting, Saving and Presentation , auto Content Wizard.			
Text Books 1. MS Office XP for Everyone By Sanjay Saxena (Vikas Publi, Noida) 2. MS-Office 2000(for Windows) By Steve Sagman 3. A First Course in Computers – Sanjay Saxena			



B. Sc. Semester II (Computer Science)
SEC-2 DATA VISUALIZATION (Practical)

**SEC-2
Practical**

Hours: 04 Hours/Week

Course Code: BCS2SEC02P

**Maximum Marks:
(CIE + SEE = Total)
20 + 30 = 50**

Credit 02

Practical List

1. **Identify Data Types**
 - Classify a given dataset into numerical, categorical, temporal, and geographical types.
2. **Data Visualization Workflow**
 - Collect a small dataset from a public source (e.g., Kaggle, government portal), clean it in Excel, and create basic charts.
3. **Tool Comparison**
 - Create a simple bar chart using Excel, Tableau, and Power BI. Compare features (ease of use, customization, interactivity).
4. **Storytelling with Charts**
 - Build a visual story using a dataset (e.g., COVID-19 data, sales data). Present a narrative using charts with annotations.
5. **Dashboard Narrative**
 - Design a mockup for a dashboard that tells a story for a business scenario (e.g., sales trends or HR attrition).
6. **Presentation Analysis**
 - Analyze a poorly designed presentation ("Death by PowerPoint") and redesign it with a storytelling approach.
7. **Connecting to Data**
 - Load Excel/CSV data into Tableau and explore data fields.
8. **Create Basic Visualizations**
 - Build a bar chart, line graph, and map using "Show Me".
9. **Create a Dashboard**
 - Combine multiple visualizations into an interactive dashboard with filters.
10. **Use Calculations**
 - Apply row-level and aggregate calculations to create custom fields.
11. **Quick Table Calculations**
 - Use built-in functions like Running Total, Percent Difference, etc.
12. **Power BI Setup and Data Import**
 - Install Power BI Desktop and import data from Excel and CSV.
13. **Basic Visualizations**
 - Create bar, pie, and line charts using Power BI visuals.
14. **Data Cleaning in Power Query**
 - Remove duplicates, handle missing values, change data types.
15. **Create a Dashboard**
 - Develop a multi-page dashboard with slicers and visuals.



Shree.