Rayat Shikshan Sanstha's

SADGURU GADGE MAHARAJ COLLEGE, KARAD.

(An Autonomous)

Accredited By NAAC with 'A^{+} (3.63 CGPA)' Grade

ISO-9001-2015 Certified

Affiliated to Shivaji University, Kolhapur

B.Sc.Computer Science (Entire)

DEPARTMENT OF BCS

Under the Faculty of Science and Technology
Choice Based Credit System (CBCS)

Regulations in accordance with **National Education Policy**
to be implemented from Academic Year 2024-25

Syllabus For

B.Sc. Computer Science(Entire) Part -II

SEMESTER III & IV

(Syllabus to be implemented from June 2025)

Rayat Shikshan Sanstha's
SADGURU GADGE MAHARAJ COLLEGE, KARAD
(AN AUTONOMOUS)
COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

B. Sc. Computer Science (Entire) Part-I (2024-25)

Evaluation Pattern for Theory and Practical

Semester-III

Course Code	Subject Code	Name of Subject	Credits	TH/PR	CCE		SEE		Total Theory/Practical Marks
					Max	Min	Max	Min	
MJBCSE24-301	BCSE24-301	ObjectOriented ProgrammingUsing C++	02	TH	10	04	40	16	**50**
MJBCSE24-302	BCSE24-302	DatabaseConcepts	02	TH	10	04	40	16	**50**
MJBCSE24-303	BCSE24-303	Pratical based on MJ-BCS24-301 & MJ-BCSE24-302	02	PR	-	-	50	20	**50**
MNBCSE24-301	MN-BCSE24-301	Computer organization	02	TH	10	04	40	16	**50**
MNBCSE24-302	MN-BCSE24-302	Electronic communication	02	TH	10	04	40	16	**50**
MNBCSE24-303	MN-BCSE24-303	Practical based on MNBCSE24-301 & MNBCSE24-302	02	PR	-	04	40	20	**50**
OE-BCSE24-301	OE-BCSE24-301	Strategic IT Management	02	TH	10	04	40	16	**50**
VSCI-BCS24-301	VSCI-BCSE24-301	Web Technology (HTML & CSS)	02	PR	-	-	50	20	**50**
SEC I-BCS24-301	SECI-BCS24-301	Statistics for Computer Science-I	02	TR	10	04	40	16	
AECI-BCS24-301	AECI-BCS24-301	Formal Communication	02	TR	10	04	40	16	**50**
CCI-24-301	CCI-24-301	Basic of Yoga	02	TH	-	-	50	16	**50**

Total	**22**						**550**
Total of SEM-III	**550**						

Semester-IV

Course Code	Subject Code	Name of Subject	Credits	TH/PR	CCE		SEE		Total Theory/Practical Marks
					Max	Min	Max	Min	
MJBCSE24-401	BCSE24-401	Data Structure With C++	02	TH	10	04	40	16	**50**
MJBCSE24-402	BCSE24-402	RDBMS with PL-SQL	02	TH	10	04	40	16	**50**
MJBCSE24-403	BCSE24-403	Pratical based on MJBCSE24-301 & MJBCSE24-302	02	PR	-	-	50	20	**50**
MNBCSE24-401	BCSE24-401	Computer Networking	02	TH	10	04	40	16	**50**
MNBCSE24-402	BCSE24-402	Micro-Controller & Interfacing	02	TH	10	04	40	16	**50**
MNBCSE24-403	BCSE24-403	Practical based on MNBCSE24-401 & MNBCSE24-402	02	PR	-	-	50	20	**50**
OE-BCSE-24-401	OE-BCSE-24-401	Enterprise Resource Management	02	TH	10	04	40	16	**50**
SECII-BCSE24-401	SECII-BCSE24-401	Statistics for Computer Science-II	02	TH	10	04	40	16	**50**
AECII-BCSE24-401	AECII-BCSE24-401	Soft Skills	02	TH	10	04	40	16	**50**
VECES-24-401	VECES-24-401	Environmental Studies	02	TH	-	-	50	20	**50**
CEPI24-401	CEPI24-401	Community Engagement Programme-I(Field Work)	02	TH	-	-	50	20	**50**
Total			**22**						**550**
Total of SEM-II			**550**						
Grand Total of SEM-I and SEM-II			**550+550=1100**						

Rayat Shikshan Sanstha's
SADGURU GADGE MAHARAJ COLLEGE, KARAD
(AN AUTONOMOUS)
COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

B. Sc. Computer Science (Entire) Part-I (2024-25)

(Under Faculty of Science and Technology)

Program Outcomes (PO):

Upon successful completion of the B.Sc. Computer Science (Entire), the student should have met the following Outcomes:

PO1	Disciplinary Knowledge: Graduates will gain in-depth understanding in their specific major or discipline, mastering the foundational principles and theories, as well as advanced concepts. Execute strong theoretical and practical understanding developed from the specific programme in the area of work.
PO2	Problem-Solving Skills: Graduates will learn to use their knowledge to identify, analyze, and solve problems related to their field of study.
PO3	Analytical Skills: Graduates will gain the ability to collect, analyze, interpret, and apply data in a variety of contexts. They might also learn to use specialized software or equipment.
PO4	Research Skills and Scientific temper: Depending on the field, graduates might learn how to design and conduct experiments or studies, analyze results, and draw conclusions. They might also learn to review and understand academic literature.
PO5	Communication Skills: Many programs emphasize the ability to communicate effectively, both orally and in writing. Graduates may learn to present complex information clearly and succinctly, write detailed reports, and collaborate effectively with others.
PO6	Ethics and Professionalism: Graduates may learn about the ethical and professional standards in their field, and how to apply them in real-world situations.
P07	Integration: Integrate knowledge of Computer Science with associated subjects like mathematics, statistics, electronics etc. to build and explore problem solving concepts.

Program Specific Outcomes (PSO):

PSO1	Technical Expertise: Implement fundamental knowledge of core and programming computer subjects like C programming, operating system etc. For developing effective technical and computing solutions by incorporating creativity and logical reasoning.

PSO2 Successful Career: Deliver professional services and knowledge with updated newtechnologies like, Python, HTML, and PHP etc. in Computer science career.

PSO3 Interdisciplinary and Life Long Learning: Develop Mathematical and Electronical, Computation abilities. It also develops analytical, reasoning and logical abilities of students. Undergo higher studies, certifications and technology research as per marketneeds.

PSO4 Human Values and Ethics: Understand professional and ethical responsibilities in order towork at different positions in organizations and at a societal context.

1. **Introduction**

a) The name of the program shall be B.Sc. Computer Science (Entire).

b) After completion students will be able to apply standard software engineering practices and strategies in software project development using an open-source programming environment to deliver a quality product for business success.

c) Job Opportunities: The program addresses the job requirements in many domains such as web development, mobile development, Testing and one involving an assortment of hardware and software.

d) Many graduates begin their careers as junior programmers and, after some experience, are promoted as system analysts. Others seek an entrepreneurial role in the Information Technology world as independent business owners, software authors, consultants, or suppliers of systems and equipment.

e) Career opportunities exist in such areas as software development and hardware integration, technical writing, training others on a computer, software design, software testing and technical support.

f) The present curricula focus on the learning aspect from three dimensions viz. Conceptual Learning, Skills Learning and Practical / Hands-on.

2. **Medium of Instruction:**

The medium of instruction will be English only.

3. **Admission Procedure**

To be eligible for admission to the B. Sc. Computer Science [Entire] a candidate must have passed

- HSC (10+2) from science stream

OR

- Three Year Diploma Course (after SSC i.e. 10^{th} Standard), of Board of Technical Education conducted by Government of Maharashtra or its equivalent

4. **Course Structure:**

Lectures and Practical should be conducted as per the scheme of lectures and practical‟s indicated in the course structure.

5. **Teaching and Practical Scheme**

a) Contact session for teaching 60 minutes each.

b) One Practical Batch should be of 20 students.

c) Practical evaluation should be conducted after the commencement of university examination.

6. Assessment

1. The final practical examination will be conducted by the university appointed examiners internal as well as external at the end of semester for each lab course and marks will be submitted to the university by the panel.
2. The practical examination will be conducted semester wise in order to maintain the relevance of the respective theory course with laboratory course.
3. The final examinations shall be conducted at the end of the semester.
4. Nature of question paper: Nature of question paper is as follows for University end semester examination.

❖ **Theory Examination**:

Que. No.	**Question**		**Marks**
Q.1.	08 Multiple Choice Questions	(One Mark each)	**08 Marks**
Q.2.	Attempt any TWO out of THREE	(08 marks each)	**16 Marks**
	a)		
	b)		
	c)		
Q.3.	Attempt any FOUR out of SIX	(4 marks each)	**16 Marks**
	a)		
	b)		
	c)		
	d)		
	e)		
	f)		
		Total Marks	**40 Marks**

- **Internal Evaluation examination of 10 marks should be in the form of assignments**.

❖ **Practical Examination**:

1. Practical Examination will be conducted at the end of Semester.
2. Each question paper carries **50 Marks**.
3. Duration of Practical Examination**: 3 Hrs**.
4. Nature of Question paper: There will be four questions of 20 marks each. Students will be attempted any two out of four questions. The distribution of practical‟s papers:

Each question carries	: 20 marks (20 x 02 = 40 Marks)
Certified Journal carries	: 5 Marks and
Viva voce carries	: 5 Marks
Total Marks	**: 50 Marks**

7. Standard of Passing:

1. Minimum 16 marks in each subject. There shall be separate passing for theory (semester end exam and Internal) and practical also.
2. Admission to B.Sc. Computer Science (Entire) Part II is allowed even if the student fails in all the subjects of part I

3. Admission to B.Sc. Computer Science (Entire) Part III is allowed only if student is passed on all the subjects of B.Sc. Computer Science (Entire) Part I

8. Board of Paper Setters /Examiners:

For each Semester end examination there will be a board of Paper setters and examiners for every course. While appointing paper setter /examiners, care should be taken to see that there is at least one person specialized in each unit of the course.

9. Credit system implementation:

As per the University norms

10. Clarification of Syllabus:

The syllabus committee should meet at least once in a year to study and clarify any difficulties from the Institutes.

11. Eligibility of Faculty:

MCA (from any faculty) or M.Sc. (Computer Science) with at least B+ or equivalent

12. Revision of Syllabus:

As the computer technology experience rapid rate of obsolescence of knowledge, revision of the syllabus should be considered every two/three years.

13. Fees Structure: As approved by the Shivaji University fee fixation committee.

14. Intake Capacity: 80

15. Award of Class:

Grading: Shivaji University has introduced a Seven-point grading system as follows:

B.Sc. Computer Science (Entire) Part I Semester I & II

Multiple Entry and Multiple Exit Option

(NEP-2020) 2.0

Syllabus to be implemented from Academic Year 2024-25

Sr. No.	Marks Obtained out of 100	Marks Obtained out of 50	Grade Point	CGPA	Letter grade
1.	91 – 100	46 – 50	10	9.0 to 10.0	O: Outstanding
2.	81 – 90	41 – 45	9	8.0 to 8.99	A+
3.	71 – 80	36 – 40	8	7.0 to 7.99	A
4.	61 – 70	31 – 35	7	6.0 to 6.99	B+
5.	51 – 60	26 - 30	6	5.0 to 5.99	B
6.	40 – 50	20 – 25	5	4.0 to 4.99	C:
7.	< 40	< 20	0 to 4	0.0 to 3.99	Fail
8.	Absent	Absent	0	-	-

B.Sc. Computer Science (Entire) Part – I: Semester I & II

Multiple Entry and Multiple Exit Option

(NEP-2020)

Syllabus to be implemented from Academic Year 2024-25

Title: **B.Sc. Computer Science (Entire)**

1. Year of implementation: Syllabus will be implemented from June 2024 onwards
2. Duration: B.Sc. Computer Science (Entire) Part I. The duration of course shall be one year(Two semesters).
3. Pattern: Pattern of examination will be semester
4. Medium of Instruction: English
5. Structure Of Course:

Multiple Entry and Multiple Exit Option (NEP-2020)

B.Sc. Computer Science (Entire) Program Structure

B.Sc. Computer Science (Entire) Part - II (Level-4.5)

Semester	Subject Code	Course Title
SEM – III	BCSE24-301	ObjectOriented ProgrammingUsing C++
	BCSE24-302	DatabaseConcepts
	BCSE24-303	Pratical based on MJ-BCS24-301 & MJ-BCSE24-302
	MN-BCSE24-301	Computer organization
	MN-BCSE24-302	Electronic communication
	MN-BCSE24-303	Practical based on MNBCSE24-301 & MNBCSE24-302
	OE-BCSE24-301	Strategic IT Management

	VSCI-BCSE24-301	Web Technology (HTML & CSS)
	SECI-BCS24-301	Statistics for Computer Science-I
	AECI-BCS24-301	Formal Communication
	CCI-24-301	Basic of Yoga
SEM – IV	BCSE24 -401	Data Structure With C++
	BCSE24 -402	RDBMS with PL-SQL
	BCSE24 -403	Pratical based on MJBCSE24-301 & MJBCSE24-302
	BCSE24 -401	Computer Networking
	BCSE24 -402	Micro-Controller & Interfacing
	BCSE24 -403	Pratical based on MNBCSE24-401 & MNBCSE24-402
	OE-BCSE-24-401	Enterprise Resource Managemant
	SECII-BCSE24-401	Statistics for Computer Science-II
	AECII-BCSE24-401	Soft Skills
	VECES-24-401	Environmental Studies
	CEPI24-401	Community Engagement Programme-I(Field Work)

SEMESTER-III (Duration - Six Month)										
Sr. No.	Subject Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectures (Per week)	Hours (Per week)	Credit	Maximum Marks	Minimum Marks	Exam Hours	Maximum Marks	Minimum Marks	Exam. Hours
1	BCSE24-301	2	-	2	40	16	2	10	04	-
2	BCSE24-302	2	-	2	40	16	2	10	04	-
4	BCSE24-303	2	4*	2	40	16	2	10	04	-
5	MN-BCSE24-301	2	-	2	40	16	2	10	04	-
7	MN-BCSE24-302	2	-	2	40	16	2	10	04	-
8	MN-BCSE24-303	2	4*	2	40	16	2	10	04	-
3	OE-BCSE24-301	-	-	2	40	16	2	10	04	-
6	VSCI-BCSE24-301	-	4*	2	40	16	2	10	04	-
9	SECI-BCS24-301	-	-	2	40	16	2	10	04	-
10	AECI-BCS24-301	-	-	2	40	16	2	10	04	-
11	CCI-24-301	2	-	2	40	16	2	10	04	-
	Total (A)			**22**	**440**			**110**	**440 + 110 = 550**	
*** Lectures per week per batch**										

SEMESTER-IV (Duration- Six Month)										
Sr. No.	Subject Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment(UA)			Internal Assessment (IA)		
		Lectures (Per week)	Hours (Per week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
1	BCSE24-401	2	-	2	40	16	2	10	04	-
2	BCSE24-402	2	-	2	40	16	2	10	04	-
4	BCSE24-403	2	4*	2	40	16	2	10	04	-
5	BCSE24-401	2	-	2	40	16	2	10	04	-
7	BCSE24 -402	2	-	2	40	16	2	10	04	-
8	BCSE24 -403	2	4*	2	40	16	2	10	04	-
3	OE-BCSE-24-401	-		2	40	16	2	10	04	-
6	SECII-BCSE24-401	-	4*	2	40	16	2	10	04	-
9	AECII-BCSE24-401	-		2	40	16	2	10	04	-
10	VECES-24-401	-		2	40	16	2	10	04	-
11	CEPI24-401	2	-	2	40	16	2	10	04	-
	Total (B)			**22**	**440**			**110**	**440 + 110 = 550**	
*** Lectures per week per batch**										
	Total (A+B)		**22+22 = 44**		**880**			**220**	**880 + 220 = 1100**	

• Student contact hours per week: **30** Hours (Min.)	• Total Marks for B.Sc. Computer Science (Entire)-II: **1100**
• Theory and Practical Lectures: **60** MinutesEach	• Total Credits for B.Sc. Computer Science (Entire)-II (Semester III & IV): **44**
• **Requirement for Entry at Level 4.5: Completed all requirements of the 10+2**	
• DSC: Department Specific Core • OE: Open Elective	• IKS: Indian Knowledge System • VEC: Value Education Course
• Practical Examination is Semester wise before Theory Examination.	• Separate passing is mandatory for Theory, Internal and Practical Examination
• **Exit Option at Level 4.5:** Students can exit after Level 4.5 with under **Certificate Course in Computer Programming** if he/she completes the courses equivalent to minimumof **44** credits and an **additional 4 credits** core NSQF course / Internship.	

B.Sc. Computer Science (Entire) - Part III

DSC: Computer Science

Total Work–Load

Subject Code	Title of the Paper	Theory Marks	Internal Marks	Lectures / week (60 min.)
Semester -III				
MJBCSE24-301	Object Oriented Programming	40	10	2
MJBCSE 24-302	Database Concepts	40	10	2
MNBCSE 24-301	Computer Organization	40	10	2
MNBCSE 24-302	Electronic Communication	40	10	2
OE-BCSE24-301	Strategic IT Management	40	10	2
SECI-BCSE24-301	Statistics for Computer Science-I	40	10	2
AECI-BCSE24-301	Formal Communication	40	10	2
CCI-24-301	Basics of Yoga	40	10	2
DSC Practical – III				
Subject Code	**Title of the Paper**	**Total Marks**	**Internal Marks**	**Lectures per week/ Batch**
MJBCSE24-301	Object Oriented Programming	40	10	4
MJBCSE 24-302	Database Concepts	40	10	4
MNBCSE24-301	Computer Organization	40	10	4
MNBCSE24-302	Electronic Communication	40	10	4
VSCI-BCSE24-301	Web Technology (HTML & CSS)	40	10	4
Subject Code	**Title of the Paper**	**Total Marks**	**Internal Marks**	**Lectures / week (60 min.)**
MJBCSE24-401	Data Structure with C++	40	10	2
MJBCSE 24-402	RDBMS with PL-SQL	40	10	2
MNBCSE 24-401	Computer Networking	40	10	2

MNBCSE 24-402	Micro-Controller & Interfacing	40	10	2
OE-BCSE24-401	Enterprise Resource Mannagement	40	10	2
SECI-BCSE24-401	Statistics for Computer Science-II	40	10	2
AECI-BCSE24-301	Soft skills	40	10	2
VECES-24-401	Environmental Studies	40	10	2
CEPI24-401	Community Engagement Programme I(Field Work)	40	10	2

DSC Practical – IV				
Subject Code	**Title of the Paper**	**Total Marks**	**Internal Marks**	**Lectures per week / Batch**
MJBCSE24-401	Data Structure with C++	40	10	4
MJBCSE 24-402	RDBMS with PL-SQL	40	10	4
MNBCSE24-401	Computer Networking	0	10	4
MNBCSE24-402	Micro-Controller & Interfacing	40	10	2

B. Sc. Computer Science (Entire) Part-II (Semester III)
Subject Code: MJ-BCSE24-301
Subject Title: Object Oriented Programming Using C++
Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes: After completion of this course student should be able to

1. Understand basic concepts of object-oriented programming.
2. Design classes and objects and Abletouse construct or and destructor.
3. Utilize the OOP techniques like operate or overloading, inheritance, and polymorphism.

Unit	Contents	Hours Allotted
1	Object Oriented Concepts: Difference between POP and OOP. Concepts of OOP- Data abstraction, Encapsulation, Inheritance, Polymorphism. Basics of C++,Terminology: Tokens, Keywords, Identifiers, constants. Basic data types, Structure of C++program, Input and output streams. Operators in C++,Dynamic Memory allocation(New &Delete),this pointer. Dynamic initialization of variable, reference variables, default argument. Control structures: Branching and looping statements. Class,Object and Functions: Classes and objects-Definitions, defining class, Defining member functions within class and outside class, Nesting of member functions, static data members, static member function Access modifiers: private, public and protected. Array of objects, object as function argument, returning objects. Inline function, Friend function and friend class.	15
2	Constructor and Operator Overloading: Constructor: Definition, types-Default Constructor, Copy constructor, Parameterized constructor, Multiple constructors in class, constructor with default argument. Destructors. Operator overloading: Definition, Rules for overloading operator,	15

	overloading unary and binary operators. Overloading operator using friend function. InheritanceandPolymorphism Inheritance: Introduction, Defining base and derived class. Single Inheritance, Making private ember inheritable, multiple Inheritance, multilevel Inheritance, hierarchical Inheritance, hybrid Inheritance, Abstract Class,Constructors in derived class Polymorphism: Definition, Types of polymorphism: CompileTime Polymorphism, Run Time Polymorphism Virtual function.	

TextBook/Referencebook:

Object oriented programming ByE.Balagurusamy.

C++Programming–By D.Ravichandran

Let Us C++ By Yashwant Kanetkar.

Object Oriented Programming in C++-Dr.G. T.Thampi, Dr. S.S. Mantha

Mastering C++- By Venu gopal

Subject Code: MJ-BCSE24-302

Subject Title: DatabaseConcepts

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

CourseOutcomes:

After successful completion of this course, students willable to:

1. Describe the basic concepts of DBMS and various databases used in real applications.
2. Demonstrate the principles behind systematic database design approach.
3. Describe the fundamental elements of Relational Database Management Systems.

Use various commands in data languages with example.

Unit	Contents	Hours Allotted
1	**Basics of RDBMS** Characteristics of database approach, advantages and disadvantages of DBMS, Data models: Hierarchical, Network, Relational, Schema and Instances, DBMS architecture: Three Schema Architecture, Internal, Conceptual, External, Data independence: Logical, Physical, Concept of RDBMS, Terminologies: relation, attribute, domain, tuple, entities, Integrity Constraints(Domain ,Entity, Referential), Entity Relationship Model, Entity Relationships: one-one, one- many, many-one, many-many, Key: Super key, Composite Key, Candidate Key, Primary Key, Alternate Key or Secondary Key, Foreign Key), Normalization:1Nf,2NF,3NF,De-normalization,Relational algebra	15
2	**Basics of MySQL** Features of MySQL, Data types, User management, Database (Create, Use, Drop, Show, Copy), DDL,DML, DCL,TCL Commands, Clauses– Order by ,where and group by, Operators: Arithmetic(DIV,/, -,+,*,%,MOD),Comparison operator (=, <>, >, <, >=,<=), Set operators : Union, Union all, Intersect, Minus Other Operator :like, in, not, between, exists, all, any, is null, is not null, distinct	15

ReferenceBooks:

R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition ,Pearson Education, 2010.
R.Ramakrishanan, J.Gehrke,Database Management Systems 3rdEdition,McGraw-Hill,2002.
A.Silberschatz ,H.F. Korth,S. Sudarshan, Database System Concepts6thEdition, McGraw Hill, 2010.

R. Elmasri,S.B. Nava the Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.

Database System Concept– Silberschatz ,Korth

Subject Code: BCSE 24-107

Subject Title: Computer Lab-I

Credits: 02 **Teaching Scheme: Practical's – 04 Lectures / Week** **Total Marks: 50**

Following is a sample list of assignments for practical, in structures are advised to provide more lab assignments to students to meet the course specified outcomes

Practical's: Lab Course based on Subject I Practical III: Practical Based on Subject I Major V& Major VI

B.Sc. Computer Science(Entire)(Part-II)(Semester-IV)(NEP) Practical-I, (C++ and DBMS Practical based on Miner VII & VIII)	
Sr. No.	**Name of the Practical**
1	Write a C++programs based on branching and looping statements.
2	Write a C++programs based implementation of class having data member, member function inside the class.
3	Write a C++ programs based on implementation of class having data member ,member function outside the class
4	Write a C++ programs based on nesting of member function.
5	Write a C++ programs based on array of object.
6	Write a C++ programs based on passing object as Parameter
7	Write a C++ programs based on returning object
8	Write a C++ programs based on static data members and static member function
9	Write a C++programs based on programs based on usage of construct or with its types
10	Write a C++ programs based on destructor
11	Write a C++ programs based on usage of Inline and friend function
12	Write a C++ programs based on implementation of Single Inheritance
13	Write a C++ programs based on usage of constructors in derived class
14	Write a C++ programs based on implementation of multilevel Inheritance
15	Write a C++ programs based on implementation of multiple Inheritance
16	Write a C++ programs based on implementation of hierarchical Inheritance
17	Write a C++programs based on implementation of hybrid Inheritance
18	Write a C++ programs based on implementation off unction overloading
19	Write a C++programs based on implementation unary, binary operate or overloading
20	Write aC++programsbasedonimplementationoverloadingoperatorsusingfriendfunction
21	Write a C++ programs based on implementation of run time polymorphism i.e., virtual function
22	Write a C++ programs based on implementation of Abstract Class

Subject Code: BCSE 24-107
Subject Title: Computer Lab-II

Credits: 02 **Teaching Scheme: Practical's – 04 Lectures / Week** **Total Marks: 50**

- **Practical Based on Course: Subject I Major VI- DBMS**

Following is as list of assignments for practical, in struct or s are advised to provide more lab assignments to students to meet the course specified outcomes.

1	A practical on create, use and drop database.
2	A practical on DDL commands– Create table, Alter table: Add, modify, drop, rename column, rename table using first/after; Drop, Rename, Truncate)
3	A practical on DML commands–insert record, update record, select and delete record
4	A practical on creating table and use of different constraints on table. Insert at least10 records
5	A practical on user management in My SQL
6	A practical on DCL commands –Grant, Revoke
7	A practical on TCL commands–Rollback, Commit, Save Point

Subject Code: MNBCSE 24-301

Subject Title: Computer Organization

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes (COs): On completion the course ,the students will be able to

1) Understand and the designing of Combinational circuits & Sequential circuits,
2) Understand the Internal organization of Memory,
3) To study and under and the Input & Output devices organization in a computer,
4) To study the architecture CPU & internal organization of CPU

Units	Contents	Hours
1.	**A) Digital System Design:** **Combinational circuits design**: Design of Full Adder, Full Sub tractor, Design of Binary to Gray code converter, Gray to Binary code converter,Designof1-bit&2- bit Digital Comparator or (i.e. Magnitude Comparator), **Sequential circuit design:** Excitation ables of different Flip-flops, Design of 2-bit Synchronous Up counter or Down counter by using JK flip-flops or T-flip-flops, Design of 3-bit Non-sequential Counter (i.e. Random sequence Counter), **B) Memory Organization:** Classification & Characteristics of memory systems, Internal organization of RAM memory & ROM memory, Memory map, **Memory Expansion**: Horizontal memory expansion with example, Vertical memory expansion with example, Memory interfacing diagrams with CPU, Cache memory, Cache memory mapping techniques, Virtual memory & Swapping process, Paging technique & Segmentation technique, Comparison between Paging & Segmentation,	15
2.	**A) Input/Output Organization:** I/O devices, System bus, I/O bus, Addressing methods: I/O mapped I/O Isolated I/O) & Memory mapped I/O, Comparison between I/O mapped I/O & Memory mapped I/O, **I/O interfaces:** Internal block diagram of Parallel I/O interface, Internal block diagram of Serial I/O Interface (i.e. **UART**),Internal block diagram of **DMA controller,** DMA I/O data transfer with the interfacing diagram of DMA controller with the CPU, IO processor, Interfacing diagram between IO Processor & Master CPU, **B) CPU Organization:** Functions of CPU, Internal block diagram of CPU, Control unit: Introduction of Hard wired control unit& Micro-programmed control unit, **RISC&CISC** Architecture CPU, Comparison between RISC& CISCCPU, Pipelining technique inside the CPU, Combinational ALU, Sequential ALU, Internal Organization of CPU: Accumulator based CPU, Register based CPU, Stack based CPU	15

Reference Books:

1) Computer Organization,by J. P. Hays,
2) Digital System Design ,by Techmax/ Niralipublication,
3)Computer System Architecture by Morris Mano,

Subject Code: MNBCSE 24-302

Subject Title: Electronic communication

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes (COs): On completion of the course, the students will be able to:

1) Understand the concept of Electronic communication,
2) Understand Different Modulation techniques,
3) Understand Different Multiplexing techniques,
4) Understand wireless telecommunication systems.

Unit	Contents	Hours Allotted
1	**A) Introduction to Electronic Communication Systems:** Block diagram of Electronic communication system, Electromagnetic spectrum ,Types of Electronic communication, Applications of different Communication system, Noise signal , types of Noise signal, Signal to Noise ratio, Signal bandwidth, Channel bandwidth, Nyquist Sampling theorem, Shannon's the orem for channel capacity, **B) Analog Modulation:** Need of modulation, classification on of modulation techniques, Baseband signal, carrier signal, Modulation, demodulation, Analog modulation: **Amplitude modulation** & demodulation , Representation of AM signal in Time domain &Frequency domain, Modulation index, Equation of A Msignal, Power distribution in AM signal, Frequency Modulation & Demodulation, Representation of FM signal in time domain & frequency domain, Modulation index, Comparison between AM & FM modulation	15
2	**A) Digital Modulation & Multiplexing:** Classification of Pulse modulation: PAM, Pulse code modulation (PCM), Delta modulation, block diagrams & working of each, Digital modulation: ASK, FSK, PSK, Block diagram of FSK- MODEM, **Multiplexing:** Time division multiplexing, frequency division multiplexing, Code division multiplexing, **B) Wireless Communication:** Introduction to mobile communication, Cellular concept, Working of GPS, Handover mechanism in mobile communication, Introduction to GPRS, **Wireless Protocols:** RFID, Zig Bee , Blue Tooth & WiFi protocols, Comparision between these wireless protocols,	15

ReferenceBooks:

1. Electronic Communication by Roddy Coolen,
2. Electronic Communication by Robert Kennedy,
3. Communication Electronics by L.E.Frenzel

Subject Code: MNBCSE 24-303

Subject Title: Pratical based on MJ-BCS24-301 & MJ-BCSE24-302

Credits: 02 Teaching Scheme: Practical,,s – 04 Lectures / Week Total Marks: 50

List of Laboratory Assignments

Sr. No.	Name of the Practicals
1	Study of Amplitude Modulation & Demodulation
2	Study of Frequency Modulation & Demodulation,
3	Study of ASK Modulator & Demodulation,
4	Study of FSK Modulation & Demodulation
5	Study of PAM modulation & Demodulation
6	Study of PWM modulation & Demodulation
7	Study of Pulse code Modulation & Demodulation
8	Study of BPSK modulation & demodulation
9	Study of 2 bit Synchronous Up & Down counter,
10	Study of 4 bit Asynchronous counter
11	Study of Binary to Gray & Gray to Binary code convertor
12	Study of 1 bit Digital Comparator
13	Study of Schmitt Trigger by using OPAMP
14	Study of Integrator & Differentiator, by using Op-Amp
15	Study of 3 bit flash ADC circuit
16	Study of LDR based light control system
17	Study of architecture of Motherboard of Computer
18	Study of Passive filters & Active filters using Op-Amp
19	Study of wave form generations using Op Amp,

20	Study of Oscillators using Op-Amp,

Subject Code: OE-BCSE24-301

Subject Title:Strategic IT Management

Credits: 02 Teaching Scheme: **Theory – 2 Lectures / Week** Total Marks: 50

Course Outcomes:

After completion of this course students will be able to–

1. Understand business strategy and IT alignment.
2. Develop plan for IT strategy for any organization.
3. Understand IT sourcing strategy for the organization.

Unit	Contents	Hour Allotted
1	**Business Strategy and IT:** • Introduction of business strategy-Challenges and opportunities, establishing principles. • IT Strategy- Applications strategy, Data and Technology management strategy for IT, strategy for programs, project and portfolio management, IT service management strategy. • Developing IT strategy for competitive advantage. Business and IT alignment, challenges of IT and business strategy alignment.	15
2	. **Strategic IT Planning(SITP):** • Introduction of strategic plan, process, difficulties in developing and executing SITP, SITP approaches, content of SITP, • Resource planning, **IT Governance**: Definition and Purpose of IT Governance, Areas of IT Governance-strategic alignment, Value Delivery, Risk Management, Resource management, Performance measurement. Challenges in IT Governance	15

ReferencesBook:

1. IT strategy and Management by Sanjiva Dubey,Forth Edition,PHILearningPrivateLimited,Delhi,2018
2. IT Governance, Peter Weill and Jeanne WRoss, Harward Business School Press
3. Strategies forInformationTechnologyGovernance,WimVanGrembrgen,IdeaGroupPublishing
4. ITGovernance,MartinFrohlichandKartGlasher,GablerPublication5.ITGovernance,APracticalGuideby Christopher BGillies

Subject Code: VSCI-BCSE24-301

Subject Title: Web Technology(HTML & CSS)

Credits: 02 **Teaching Scheme: Practical's – 04 Lectures / Week** **Total Marks: 50**

CourseOutcomes:

Students who complete this course should be able to:

1. Understand basics well as advanced concepts of HTML
2. Understand basics of CSS to design a page.

Design and develop website using HTML and CSS

Unit	Contents	Hour Allotted
1	**INTRODUCTIONTOHTML** • Introduction, Elements of HTML • Advantages and Disadvantages of HTML • Basic structure of HTML ,HTML Tags–Tags and attributes • Basic HTML tags, HTML headings and paragraphs • Text formatting tags-<b>,<i>,<u>,,,<small>, <ins>,<del>,<sub>,<sup> **INTRODUCTION TO CSS** • Introduction to CSS, Features of CSS, Basics of CSS Understanding the syntax of CSS, Types of Style Sheets–Inline Style, Internal or Embedded Style, External or Linked Styles.	15
2	**ADVANCED HTML** • Creating links in HTML ,Images in HTML, Tables in HTML Lists in HTML, Frames in HTML Forms in HTML-Form tag, Input tag, Select tag. **FORMATTINGUSINGCSS** • Formatting Text and Fonts • Formatting colors and Backgrounds • CSS Borders, Margins and paddings CSS Selectors–Group, Id, Class.	15

Text Books/ Reference Books

4. Teach Yourself Web Technologies–Ivan Bayross, BPB Publications
5. Web Technology–Ramesh Bangia
6. HTML 4Unleashed-SecondEdition-RickDranell
7. HTML &CSS :The Complete Reference-Fifth Edition–Thomas A. Powell
8. HTML5&CSS 3-SeventhEdition–Castro Elizabeth and Bruce Hy slop

HTML Black Book–Steven Holzner

Subject Code:SECI-BCSE24-301

Subject Title: Statistics for Computer Science I

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes:

After completion of this course students should be able to

1. Understand basics of univariate random variable and probability distribution.
2. Understand common discrete probability distributions like Uniform, binomial, Poisson distribution.
3. Analyze data effectively using different probability distributions.
4. Get insight to apply standard discrete probability distributions to different situations.

1.

Formatting

Unit	Contents	HoursAllotted
1	1.1 Introduction to statistical experiment (deterministic and non-deterministic), random experiment, sample space (finite & countably infinite), events and its types, random variable (r.v.), discrete random variable and its real-life examples. 1.2 Concept of probability, Classical definition of probability, Axiomatic definition of probability, Theoremsonprobability: 1. $P(\varphi) = 0$, 2. $P(A') = 1 - P(A)$, 3. if $A \subseteq B$ then $P(A) \leq P(B)$, Conditional probability, independent events (for 2 and 3 events), theorems on independence of two events: if A and B are independent then, i) A and Bc are independent, ii) Ac and B are independent, iii) Ac and Bcare independent., Union rule for i) any two events, ii) for independent events, iii) for exclusive events, ● Multiplication rule, Baye's theorem, Illustrative examples.	**15**

2	2.1 Probability distribution of discrete r.v. (p.m.f.), cumulative distribution function of r.v. (c.d.f.), expectation and variance of discrete random variable, properties of c.d.f., graph of p.d.f. and c.d.f.Illustrative examples. 2.2 Standard Discrete Prob. Distributions: Introduction to random experiments with special reference to computer science, Discrete Uniform Distribution: definition of p.m.f., real life examples, c.d.f., mean and variance. Binomial distribution: Bernoulli trials, definition of p.m.f., real life examples, c.d.f., mean and variance, recurrence relation. Poisson distribution: definition of p.m.f., real life examples, c.d.f., mean and variance, recurrence relation,Illustrative examples.	**15**

ReferenceBooks:

1. Parimal Mukhopadhyay: An Introduction to the Theory of Probability. World Scientific Publishing.
2. Hogg R. V. and Criag A.T.: Introduction to Mathematical Statistics (Third edition), Macmillan Publishing, New York.
3. Gupta S. C. & Kapoor V.K.: Fundamentals of Mathematical Statistics. Sultan Chand & sons, New Delhi.
4. Goon, A.M., Gupta M.K. and Dasgupta B: Fundamentals of Statistics Vol. I and Vol. II World Press, Calcutta.
5. Mood A.M., Graybill F.A.: Introduction to theory of Statistics. (Chapter II, IV, V, VII) and Boes D.C. Tata, McGraw Hill, New Delhi. (Third Edition)
6. Walpole R.E. & Mayer R.H.: Probability & Statistics. (Chapter 4, 5, 6, 8, 10) Mac Millan Publishing Co. Inc, New York.

Subject Code:AECI-BCSE24-301

Subject Title: Formal Communication

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes:

After successful completion of this course, students will able to:

1. Introduce communication techniques
2. Have professional correspondence techniques

Enhance writing skills

Unit	Contents	HoursAllotted
1	Communication: Nature and Importance of Communication, Objectives of Communication, Importance of Communication, Process and barriers to Communication, Elements of Communication, Forms of Communication Verbal Communication Techniques: Art of Speaking, Speech Styles. Oral Presentation- Preparation of Formal Speech, Meetings, Interviews, Group Discussion, Debate, Elocution, Extempore.	15
2	Non-verbal Communication-Meaning, Characteristics & classification of Non-verbal Communication, Body Language, Gestures, Postures. Listening & observation skills. Rapid review of Grammar:- Corrections of common errors, Verb and its subject, forms of verb, Use of phrases and idioms, Use of infinitive Gerund and Participle, Errors & Use of Adjective and adverb, Punctuation and capitalisation.	15

Reference Books:

1. R.K. Chaddha Communication Techniques and skills – DhanpalRai Publication, NewDelhi.
2. Pravil S. R. Bhatia, Professional Communication Skills- S. Chand and Co.,NewDelhi.
3. J.D.O'Connor, Better English pronounciation.
4. Wren and Martin, Highschool English Grammer and Composition – Chand and Co.,New Delhi.

Subject Code:CCI-24-301

Subject Title: Basics of Yoga

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes:

After successful completion no this course, students willable to:

1. To understand the importance of Yoga

To understand various Asans

Unit	Contents	HoursAllotted
1	. Yoga Definition, Objectives of yoga Education Difference between Yoga Asana, and physical exercises, Importance of Yoga in daily life, Methods and benefits of Asanas, Pranayama and Concentration, Knowledge of five yama with more emphasis on 'Asteya', Knowledge of five Niyama with emphasis on 'Santosh', Knowledge of Aahar-Vihar, Methods and benefits of Sukshma,Vyayama, Asanas and prayers. Types of Yoga: Jnana Yoga, Bhakti Yoga, Karma Yoga, Hatha Yoga,Raja Yoga.	15
2	Role of yoga in character building, Therapeutic values of yoga, Introduction of yoga literature, Life history of Arvindo, Vivekanand and other yogis, Knowledge of Bandha, Mudra and Chakras,Methods and benefits of Asans, Pranayama and Concentration Effects of Asanas and Pranayama on physiology of human body, Concept of Nishkama Karma Yoga, Role of Yoga practices in developing concentration, will power and discipline, Techniques of stress management, Methods and benefits of Asanas, Pranayama and concentration.	15

References:

1. Light on Yoga by B.K.S. Iyengar
2. The Yamas & Niyamas: Exploring Yoga's Ethical Practice by Deborah Adele

B. Sc. Part- II Computer Science (Entire) (Semester IV)

Subject Code	Title of the Paper	Theory Marks	Internal Marks	Total Marks
MJBCSE24-401	Data Structure With C++	40	10	50
MJBCSE 24-402	RDBMS with PL-SQL	40	10	50
MNBCSE 24-401	Computer Networking	40	10	50
MNBCSE 24-402	Micro-Controller & Interfacing	40	10	50
OE-BCSE24-401	Enterprise Resource Management	40	10	50
SECI-BCSE24-401	JavaScript	40	10	50
AEC-II-BCSE24-401	Soft Skills	40	10	50
VECES-24-401	Environmental Studies	40	10	50

Practical IV

Subject Code	Title of the Paper	Practical Marks	Internal Marks	Total Marks
MJBCSE24-403	Data Structure with C++ & RDBMS with PL_SQL	40	10	50
MNBCSE24-403	Computer Networking & Micro-Controller Interfacing	40	10	50

B. Sc. Computer Science (Entire) Part-II (Semester III)
Subject Code: MJ-BCSE24-301
Subject Title: Data Structure with C++

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes: After completion of this course, student will be to

- Understand concept of data structure and concept of array operations and applications of array.
- Understand different sorting and searching algorithms for problem solving.
- Implements algorithms to solve problems using appropriate data structures.

Understand implementations of linked is tand basics of Trees.

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Unit	Contents	Hours Allotted
1	**Concepts of Data structure and Array** • Concept of Data, Data Object, Types of Data-Atomic Data, Non- atomic Data • Definition of Data Structure, types of Data Structure and advantages of Data Structure. • Array in data structure, representation of array, memory allocation of an array, multi-dimensional array **Algorithm Analysis** • Space complexity ,time complexity • Asymptotic notation(BigO, Omega Ω, ThetaΘ) • Searching algorithms-Linear search ,binary search and their algorithms Sorting algorithm-Bubble Sort ,insertion sort, selection sort, quick sort and their algorithms.	15
2	**Stack and Queue** • **Stack**: Concept of Stack: Definition, working of stack Operations on Stack: push, pop, peek, Array implementation of Stack, Linked List implementation of Stack, Applications of Stack-Recursion, Infix, Prefix, Postfix, conversion from Infix to Prefix and Infix to Postfix • **Queue**: Concepts of queue: Definition, working of queue, Operations on Queue :Insert, Delete, peek, Array implementation of queue, Linked List Implementation of Queue, Types of Queue-Linear, Circular and Priority, Applications of Queue. **Linked List and Tree** • **LinkedList**: Concept of Linked List	15

	Memory representation of Linked List ,Operations on Linked List: Insertion ,Deletion, Display and Search, Types of Linked List: Singly, Doubly Linked List & Circular Linked List **Tree**: Definition of Tree, Tree terminology(root, child, parent, sibling, descendent, ancestor, leaf/external node, branch node/internal node, degree, edge, path, level, depth, height of node, height of tree, forest), Difference between Binary Tree and Binary Sea	

TextBook /Reference book:

1. Data structure through C++- Yashwant Kanitkar (BPB Publications)
2. Principles of Data structures using c++- Vinu V. Das(New Age International Publication)
3. Data Structures with C-SEYMOURLIPSCHUTZ(Tata McGraw-Hill)
4. Data structures, Algorithms and Applications in C++,S.Sahni, University Press(India)Pvt.Ltd,2nd edition, Universities Press Orient Longman Pvt. Ltd.

Subject Code: MJ-BCSE24-302
Subject Title: RDBMS with PL-SQL

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

CourseOutcomes:

1. After successful completion of this course,students willable to:
2. Understand various functions and sub queries.
3. Understand various joins and views.
4. Use the control statements and stored procedures.
5. Use the cursors and triggers.

Unit	Contents	Hours Allotted
1	**MySQL Functions, Sub queries and Join.** • **Functions in MySQL:** Aggregate functions(avg,count,min,max,sum), String Functions (con cat, instr, mid, length, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt), Date and Time Functions (add date, date diff, day, month, year, hour, min, sec). • **Sub queries**–Concepts of Sub queries, sub queries with IN,EXISTS,NOT EXISTS, sub queries restrictions, Nested sub queries, ANY/ALL clause, correlated sub queries, Group by and Having clause. • **Concepts of Join**, Types of Joins- Inner Join, Outer Join, Left Join, Right Join, Cross Join Views(creating, altering dropping, renaming and manipulating views).	15
2	**Advanced MySQL** • **Control Statements**- If, case and loop, • **Block Structure and Stored procedures**–Creating and executing procedures with and without parameters, • **Cursors-**Declare, open, fetch ,close, **Triggers**-Create, show and drop trigger, Types of triggers.	15

ReferenceBooks:

1. R.Ramakrishanan, J.Gehrke,Database Management Systems 3rd Edition,McGraw- Hill, 2002.
2. A.Silberschatz,H.F. Korth,S.Sudarshan, Database System Concepts6th Edition,

McGraw Hill, 2010.
3. R.Elmasri,S.B.Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.

Subject Code: BCSE 24-107

Subject Title: Computer Lab-I

Credits: 02 Teaching Scheme: Practical's – 04 Lectures / Week Total Marks: 50

Following is a sample list of assignments for practical, in structures are advised to provide more lab assignments to students to meet the course specified outcomes

- **Practical Based on Course: Subject I Major VII: Data Structure through C++**

B.Sc .Computer Science(Entire)(Part-II)(Semester- IV)(NEP) Practical-I, (C++and DBMS Practical based on Miner VII & VIII)	
Sr. No.	**Name of the Practical**
1	Write a C++ program to implement recursive i)Linear search ii) Binary search
2	Write a C++ program to implement sorting methods(Using Array) i)Bubble sort ii)Selection sort iii)Quick sort iv)Insertion sort
3	Write a C++ program to implement the following using an array a)Stack ADT b)Queue ADT
4	Write a C++ program to implement list ADT to perform following operations
5	Insert an element into a list
6	Delete an element from list
7	Search for a key element in list
8	Count number of nodes in list
9	Write C++ program to implement the following using a singly linked list a)Stack ADT b)Queue ADT
10	Write C++ program for implementing sorting methods(Using Linked List) i)Bubble sort ii)Selection sort iii)Quick sort iv)Insertion sort

Subject Code: MNBCSE 24-401

Subject Title: Computer Networking

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes (COs): On completion the course,the students will be able to

1. Understand the concept of Networks & Network Models,
2. Understand different Networking Devices& Transmission media,
3. Understand the data linking, data flow control & error detection,
4. Understand Network Layer, Transport Layer, Application Layer,

Units	Contents	Hours
1.	**A) Computer Networks & Network Models:** ClassificationofNetworks,NetworkTopologies,NetworkModels:TCP/IPModel, 7 Layered ISO/OSI Model, Applications of each Layer of ISO/OSI Model, **B) Physical Layer:** Transmission Media: Guided & Unguided Media, Co-axial Cable, Optical fiber, Ground-wave Propogation, Sky-wave Propogation, Microwave linking, Satellite linking, Networking devices: Hub, Switch, Router, Bridge, Gateway, Data Modems, Multiplexing techniques, **C) Data-Link Layer:** Data-flow control- Framing, Data Error detection & Data Error correction, Stop-and Wait Protocol, Sliding Window Protocols,	15
2.	**A) Network Layer:**LogicalAddressing,IPv4addressing:addressspace,classes of addressing, IPv6 addressing, Comparison between IPv4 & IPv6 addressing, Internet Protocol(IP): IP Datagram format, Fragmentation ,ICMP Protocol &Messages, **B) Transport Layer:** Services-Connection-less & Connection-Oriented Service, UDP Protocol: User Datagram, UDP services & applications, TCPProtocol:TCPservices,TCPfeatures,TCPsegmentstructure,TCPconnection, SCTP Protocol: SCTP services, SCTP features, SCTP packet format, **C) Application Layer :**World-Wide- Web(www),Domain Name System(DNS), HTTP Protocols, FTP Protocols, Email Protocols: SMTP protocol, POP protocol, IMAP protocol, SNMP protocol, DHCP Protocol, Remote Login Protocols:TELNETProtocol,SSHProtocol,	15

ReferenceBooks:

1. Computer Networking by Andrew Tannen baum,
2. Data & Computer communicationbyWilliam Stallings,
3. Advanced Computer Networking by Nirali Publication,
4. Computer Networking &Data Communication by Nirali Publication

Subject Code: MNBCSE 24-402

Subject Title: Micro-Controller & Interfacing

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes (COs):

On completion of the course, the students will be able to

CO1:Understand the difference between Microprocessor & Micro-controller, CO2: Learn & Understand the Instruction set of Micro-controller,
CO3:To study different features of Micro-controller,
CO4:To study interfacing of different peripheral devices with Micro-controller,

Unit	Contents	Hours Allotted
1	**A) IntroductiontoMicro-controller-8051:** Comparison between Micro-controller&Microprocessor,4-bit,8-bit,16- bit&32-bit Micro-controllers & their applications, Study of 8051 Micro- controller & its family, Comparative study of 89c51, 8031, 8032,8052, 8751, 89c51RD2, 89c51VRD2, Architectureof8051:InternalBlockdiagramf8051,Reset&Clocksignal,Registers, Flags, Internal memory, SFR registers, I/O ports, **B)8051InstructionSet:**InstructionSet,AddressingModes,TypesofInstruction s: Arithmetic & Logical, Data transfer, Jump, loop, CALL, Bit Manipulation, Serial Communication instructions, machine control instructions, Assembly language programming, Embedded C programming,	15

2	**A) Facilitiesin8051: Timers &Counters:** Timer Modes, Programming of Timers & Counters, Assembl y language programming , Embedded C programming, Time-delay generation, **SerialPort:**ProgrammingofSerialPort,RS-232standards,ICMAX-232,Baud Rate, Programming for transmitting character through serial port in assembly & Embedded C, **B) InterfacingofPeripheraldeviceswith8051:** InterfacingofLED,Relay,Opto-coupler,Thumb-wheelswitch,7-segmentdisplay, Interfacing of Stepper motor, DC motor(PWM), LCD (16x2) with 8051, with Assembly language & Embedded C programming,	15

ReferenceBooks:

1. 8051Micro-controllers & Interfacing by Mohammad Mazidi,
2. 8051Micro-controller by K. JAyala,
3. 8051 Micro-controller by Ajay Deshmukh,
4. Micro-controller & InterfacingbyA.P.Godse,Technical publication,
5. Micro-controoler Architecture & Programming, by Nirali Publication

Subject Code: MNBCSE 24-303

Subject Title: Pratical based on MJ-BCS24-401 & MJ-BCSE24-402

Credits: 02 Teaching Scheme: Practical,,s – 04 Lectures / Week Total Marks: 50

List of Laboratory Assignments

Sr. No.	Name of the Practicals
1	Interfacing of LED, Relay & Opto-coupler with Microcontroller-8051,
2	Interfacing of a Thumb-wheel switchor7-segmentdisplaywith 8051,
3	Time delay generation using Timers(inMode1orMode2)of 8051,
4	Interfacing of a Stepper motor with 8051,
5	Interfacing of DC motor (PWM) with 8051,
6	Arithmetic & Logical operations by using8051,
7	Interfacing of DACwith8051togenerateSquarewave&Triangularwave,
8	Interfacing of LCD display &Keyboard with micro-controller 8051,
9	Interfacing of ADC to sample a signal & convert into digital with 8051,
10	Programming & transmission of Serial data through serial port of 8051,
11	IntroductiontoNetworkingdevices,cables&connectors,Crimpingtool&LANtester,
12	PreparationofPatchcord&CrossconnectioncabletoconnectdevicesinaLAN,
13	Configuration of LAN: setting of IP addresses manually & DHCP addressing,
14	Prepare & configure a LAN of 3 computers using HUB/Switch ,for sharing of Resources,
15	Study of different Networking commands on command line interface in a LAN,
16	Study of different Networking software: Cisco Packet Tracer, Network Simulator (NS),
17	Configure Internet connectivity of your computer in a LAN with LAN Network drivers,
18	Study of sharing of resources by FTP protocol to transfer a file from one system to another,
19	Inter connect two computers by using RS-232 cable & transfer data between computers,
20	Install & configure Router/Repeater/Bridge of your LAN network,

Subject Code:-OE-BCSE24-401

Subject Title: Enterprise Resource Management

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

Course Outcomes (COs): Course Outcome- After completion of this course students will be able to–

1. Understand the concept of ERP and different ERP technologies
2. Understand ERP implementation lifecycle.

Describe the ERP models.

Unit	Contents	Hours Allotted
1	• Introduction to ERP: Defining ERP, Originand Need for an ERP System, Evolution of ERP, Benefits of an ERP System, • Reasons for the Growth of ERP Market, ERP models, Subsystems of ERP models. ERP related technologies-Business Intelligence (BI), • Data Warehousing, Data Mining, On-Line Analytical Processing (OLAP), Geographical Information System (GIS).	15
2	• ERP Implementation: Prerequisites of ERP implementation, ERP implementation strategies, • Phases in ERP implementation, ERP vendor selection criteria, Role of consultant in ERP implementation, • Role of Users in ERP implementation, Role of Top managementin ERP implementation	15

ReferenceBooks:

1. EnterpriseResourcePlanning,AlexisLeaon,(SecondEdition),TataMcGrawHillEducation Private Limited, 2011
2. ERPDEMYSTIFIED,AlexisLeon,(SecondEdition),TataMcGrawHillEducationPrivate Limited, 2008
3. ERPPlak,CarolA.,EliSchragenheim(St.LuciePressNY)
4. ReengineeringCorporation–Mammer,Micheal,JamisChambey
5. BusinessProcessReengineering–JayaramanM.S.(TMG)
6. BestPracticesinReengineering–CarrD.K.JohnansonH.J.(MGH)

BusinessProcessReengineering:Myth&Reality–CoulsonThomasC.

Subject Code: SECII-BCSE24-401

Subject Title: Statistics for Computer Science-II

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

CourseOutcomes: Aftercompletionofthiscoursestudentsshouldbeableto

1. Understand concept of continuous univariate random variable and probability distribution.
2. Understand standard continuous probability distributions like Uniform, ExponentialandNormaldistribution.
3. Analysedataeffectivelyusingabovecontinuousprobabilitydistributions.
4. Get insight to apply standard continuous probability distributions to different situations.

Unit	Contents	Hours Allotted
1	**1.1 Continuous random experiment and variable** Introduction to random experiment with special reference to infinite outcomes, Definition: infinite sample space, continuous random variable (r.v.)and its real-life examples. **1.2 Probability density function (p.d.f.)** Probability distribution of continuousr.v. (p.d.f.), cumulative distribution function of r.v. (c.d.f.), expectation (mean), median, modeand variance of continuous random variable, properties of c.d.f., graph of p.d.f. and c.d.f. Illustrative examples.	15
2	**2.1 Standard Continuous Probability Distributions**: Real life situations of continuous r.v. with reference to computer science,Continuous Uniform distribution: Definition of p.d.f., real life examples, c.d.f., mean and variance. Exponential distribution: Definition of p.d.f., real life examples, c.d.f., mean and variance, memory less property and its applications in computer science field,Illustrative examples. **2.2Normal Distribution:** Definition of p.d.f., real life examples, Standard Normal distribution, Normal curve, properties of Normal distribution, mean and variance, 6-sigma limits, Importance of 6-sigma limits in IT industry, Limiting form of Binomial to Normal and Poisson to Normal distribution (only statements), Additive propertyofNormaldistribution,Illustrativeexamples.	15

ReferenceBook:

1. Trivedi R.S.: Probability and Statistics with Reliability and Computer Science Application,
   a. Prentice–Hall of India Pvt. Ltd., New Delhi.
2. Parimal Mukhopadhyay: An Introduction to the Theory of Probability. World Scientific Publishing.
3. Hogg R.V. and Criag A.T.: Introduction to Mathematical Statistics (Third edition), Mac-Millan Publishing,NewYork.
4. Goon A.M., Gupta M.K. and Dasgupta B.: Fundamentals of Statistics Vol. I and Vol. II World Press,Calcutta.

5. Gupta S.C.& Kapoor V.K.: Fundamentals of Mathematical Statistics. Sultan Chand & sons, New Delhi.
6. Gupta S. C. & Kapoor V.K.: Applied Statistics. Sultan Chand & sons, New Delhi.
7. Mood A.M., Graybill F.A. and Boes D.C.: Introduction to theory of Statistics. Tata, Mc-Graw Hill, NewDelhi.(Third Edition)
8. Walpole R.E. & Mayer R.H.: Probability & Statistics. Mac-Millan Publishing Co. Inc, New York.

Subject Code: AECII-BCSE24-401

Subject Title: Soft Skills

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

CourseOutcomes:

The course will enable students to;

1. To empower the students towards general and technical writing, oral communications
2. To empower listening skills: letter writing, technical report writing, and business communication.

Unit	Contents	Hours Allotted
1	Expression: Practical communication skill development, business presentation with multimedia, speaking skill, prepared speech, extempore speech.	15
2	Writing: Technical/business letter, Resume Preparation, organization of writing material, poster presentation, writing technical document, preparing software user manual, preparing project documentation	15

Reference Books*:*

Business Correspondence & Report Writing, Sharma, TMH
Business Communication Strategies, Monipally, TMH
English for Technical communication, Laxminarayanan,Scitech
Business Communication, Kaul,PHI
Communication Skill for Effective Mgmt., Ghanekar,EPH

Subject Code:-VECES-24-401

Subject Title: Environmental Studies

Total Contact Hours: 30 hrs. (30 lectures)

Credits: 02 **Teaching Scheme: Theory – 02 Lect. / Week** **Total Marks: 40+10=50**

CourseOutcomes:

The course will enable students to;

3. To empower the students towards general and technical writing, oral communications

4. To empower listening skills: letter writing, technical report writing, and

business communication.

Unit	Contents	Hours Allotted
1	Definition, principles and scope of Environmental Science, Components of Environment Introduction, Atmosphere, Hydrosphere, Lithosphere and Biosphere, Natural Resources: Concept, types of resources; Renewable and Non-renewable resources, water resource, forest resources, mineral resources, energy resources, food resources, land resources, coal, petroleum, natural gas, nuclear energy, Ecosystem: Concept, Components of ecosystem, Types of Ecosystems, Productivity and energy flow, Food chain a characteristics of population: natality, mortality, fecundity, density, age distribution, relationships among organisms, population explosion, Community types and community composition.	15

2	Levels of biological diversity: genetic, species and ecosystem diversity, Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, Sanctuaries, National Parks, Biosphere reserves.	15

Reference:

1. Environmental science by S. C. Santra, New Central Book Agency (P) Ltd.
2. Environmental Studies by Dr. P. D. Raut Department of Environmental Science, Shivaji University, Kolhapur

Reference Books:

1. Agarwal B. L. (2019) *Basic Statistics*, New Age International (P) Limited.
2. Gupta S. C. (2019) *Fundamentals of Statistics*, Himalaya Publishing House Pvt. Ltd.
3. *A First Course in Probability* by Sheldon Ross (2022), Pearson pub.
4. *Statistical Methods* (An introductory text by J. Medhi), New Age International (P)Limited.
5. *Business Statistics: A First Course* by David Levine, Katherene szabat, Pearson Pub.
6. Sharma V. K. (2012) *Elements of Statistics*, Gullybaba Publishing House Pvt. Ltd.

Practical Examination:

1. Practical Examination will be conducted at the end of each Semester.
2. Each practical paper carries 50 Marks.
3. Duration of Practical Examination: 4 Hrs.

Nature of Question Paper:

i. There will be four questions of 18 marks each.
ii. In each question there are two sub questions (a) and (b) each carrying 09 marks
iii. Students have to attempt any two out of four questions.
iv. The distribution of practical paper‟s marks:

- Two questions each of 18 marks (Total 18 x 02 = 36 Marks)
- Certified Journal: 05 Marks,
- Viva voce: 04 Marks
- Case study: 05 marks
- Total Marks: 50

Course Code**: VEC- I** Course Title: **Democracy, Election and Constitution**	Syllabus will be provided by Shivaji University as per NEP