Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur 440033

Scheme and Syllabus

Bachelor of Science (Computer Application)

Submitted by

Board of Studies,

Bachelor of Science (Computer Application)

FYUGP-Scheme I-VIII Semester
Bachelor of Science (Honors/Research)
(Computer Application - Major)
Four Year (Eight Semester Degree Course)
Teaching and Examination Scheme

B.Sc. Sem-I (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Programming in 'C'	BCM1T01	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Programming in 'C'	BCM1P01	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Computer Fundamentals	BCM1T02	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Computer Fundamentals	BCM1P02	-	-	2	1	-	-	-	-	-	50	25
5	GE/OE	Refer GE/OE Basket	BGO1T01	2	-	-	2	3	80	20	40	-	-	-
6	GE/OE	Refer GE/OE Basket	BGO1T02	2	-	-	2	3	80	20	40	-	-	-
7	VSEC	Office Automation	BVS1P01	-	-	4	2	-	-	-	-	50	50	50
8	VSEC	Refer SEC Basket	BVS1P02	-	-	4	2	-	-	-	-	50	50	50
9	AEC	English Compulsory	BAE1T01	2	-	-	2	3	50	50	40	-	-	-
10	VEC	Environmental Sci.	BVE1T01	2	-	-	2	3	80	20	40	-	-	-
11	IKS	Vedic Mathematics	BIK1T01	2	-	-	2	3	80	20	40	-	-	-
12	CC	Refer CC Basket	BCC1P01	-	-	4	2	-	-	-	-	-	100	50
Total				14	-	16	**22**		**530**	**170**		**125**	**275**	

B.Sc. Sem-II (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Object Oriented Programming using 'C ++'	BCM2T03	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Object Oriented Programming using 'C ++'	BCM2P03	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Data Structures	BCM2T04	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Data Structures	BCM2P04	-	-	2	1	-	-	-	-	-	50	25
5	GE/OE	Refer GE/OE Basket	BGO2T03	2	-	-	2	3	80	20	40	-	-	-
6	GE/OE	Refer GE/OE Basket	BGO2T04	2	-	-	2	3	80	20	40	-	-	-
7	VSEC	Computer Animation	BVS2P03	-	-	4	2	-	-	-	-	50	50	50
8	VSEC	Refer SEC Basket	BVS2P04	-	-	4	2	-	-	-	-	50	50	50
9	AEC	Second Language	BAE2T02	2	-	-	2	3	50	50	40	-	-	-
10	VEC	Constitution of India	BVE2T02	2	-	-	2	3	80	20	40	-	-	-
11	IKS	Indian Astronomy	BIK2T02	2	-	-	2	3	80	20	40	-	-	-
12	CC	Refer CC Basket	BCC2P02	-	-	4	2	-	-	-	-	-	100	50
Total				14	-	16	**22**		**530**	**170**		**125**	**275**	

B.Sc. Sem-III (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Java Programming	BCM3T05	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Java Programming	BCM3P05	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Operating Systems	BCM3T06	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Operating Systems	BCM3P06	-	-	2	1	-	-	-	-	-	50	25
5	Minor	Minor 1 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
6	Minor	Minor 1 (Refer Minor Basket)		-	-	2	1	-	-	-	-	25	25	25
7	Minor	Minor 2 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
8	Minor	Minor 2 (Refer Minor Basket)		-	-	2	1	-	-	-	-	-	50	25
9	GE/OE	Refer GE/OE Basket	BGO3T05	2	-	-	2	3	80	20	40	-	-	-
10	VSEC	Refer VSC Basket	BVS3P05	-	-	4	2	-	-	-	-	50	50	50
11	AEC	Second Language	BAE3T03	2	-	-	2	3	50	50	40	-	-	-
12	FP	Field Project	BFP3P01	-	-	4	2	-	-	-	-	50	50	50
13	CC	Refer CC Basket	BCC3P03	-	-	4	2	-	-	-	-	-	100	50
Total				12	-	20	**22**		**450**	**150**		**150**	**350**	

B.Sc. Sem-IV (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Linux Operating System	BCM4T07	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Linux Operating System	BCM4P07	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Software Engineering	BCM4T08	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Software Engineering	BCM4P08	-	-	2	1	-	-	-	-	-	50	25
5	Minor	Minor 3 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
6	Minor	Minor 3 (Refer Minor Basket)		-	-	2	1	-	-	-	-	25	25	25
7	Minor	Minor 4 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
8	Minor	Minor 4 (Refer Minor Basket)		-	-	2	1	-	-	-	-	-	50	25
9	GE/OE	Refer GE/OE Basket	BGO4T06	2	-	-	2	3	80	20	40	-	-	-
10	VSEC	Refer SEC Basket	BVS4T06	-	-	4	2	-	-	-	-	50	50	50
11	AEC	English Compulsory	BAE4T03	2	-	-	2	3	50	50	40	-	-	-
12	CEP	Community Service	BCM4P01	-	-	4	2	-	-	-	-	50	50	50
13	CC	Refer CC Basket	BCC4P04	-	-	4	2	-	-	-	-	-	100	50
Total				12	-	20	**22**		**450**	**150**		**150**	**350**	

B.Sc. Sem-V (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	.NET Framework using C#	BCM5T09	2	-	-	2	3	80	20	40	-	-	-
2	DSC	.NET Framework using C#	BCM5P09	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Database Management System	BCM5T10	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Database Management System	BCM5P10	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Advanced JAVA Programming	BCM5T11	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Advanced JAVA Programming	BCM5P11	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 1	BCM5T12	2	-	-	2	3	80	20	40	-	-	-
8	DSE	Elective 1	BCM5P12	-	-	2	1	-	-	-	-	-	50	25
9	Minor	Minor 5 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
10	Minor	Minor 5 (Refer Minor Basket)		-	-	2	1	-	-	-	-	25	25	25
11	Minor	Minor 6 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
12	Minor	Minor 6 (Refer Minor Basket)		-	-	2	1	-	-	-	-	-	50	25
13	VSCE	Refer VSC Basket	BVS5P07	-	-	4	2	-	-	-	-	50	50	50
14	CEP	Community Service	BCM5P02	-	-	2	1	-	-	-	-	25	25	25
Total				**13**	**-**	**18**	**22**	**-**	**520**	**130**	**--**	**150**	**300**	**-**

B.Sc. Sem-VI (Computer Application – Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	SQL and PL/SQL	BCM6T13	2	-	-	2	3	80	20	40	-	-	-
2	DSC	SQL and PL/SQL	BCM6P13	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Data Communication and Networks	BCM6T14	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Data Communication and Networks	BCM6P14	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Cyber Security	BCM6T15	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Cyber Security	BCM6P15	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 2	BCM6T16	2	-	-	2	3	80	20	40	-	-	-
8	DSE	Elective 2	BCM6P16	-	-	2	1	-	-	-	-	-	50	25
9	Minor	Minor 7 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
10	Minor	Minor 7 (Refer Minor Basket)		-	-	2	1	-	-	-	-	25	25	25
11	VSCE	Refer VSC Basket	BVS6P08	-	-	4	2	-	-	-	-	50	50	50
12	OJT	Internship (Related to DSC)	BOJ6P01	-	-	8	4	-	-	-	-	100	100	100
Total				11	-	22	**22**		**440**	**110**		**225**	**325**	

B.Sc. Sem-VII (Honors) (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Artificial Intelligence	BCM7T17	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Artificial Intelligence	BCM7P17	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Data Warehousing	BCM7T18	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Data Warehousing	BCM7P18	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Python Programming	BCM7T19	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Python Programming	BCM7P19	-	-	2	1	-	-	-	-	25	25	25
7	DSC	Compiler Construction	BCM7T20	2	-	-	2	3	80	20	40	-	-	-
8	DSC	Compiler Construction	BCM7P20	-	-	2	1	-	-	-	-	-	50	25
9	DSE	Elective 3	BCM7T21	2	-	-	2	3	80	20	40	-	-	-
10	DSE	Elective 3	BCM7P21	-	-	2	1	-	-	-	-	25	25	25
11	RM	Research Methodology	BCM7T22	2	-	-	2	3	80	20	40	-	-	-
12	RM	Research Methodology	BCM7P22	-	-	2	1	-	-	-	-	50	50	50
Total				13	-	14	**20**		**520**	**130**		**125**	**225**	

B.Sc. Sem-VIII (Honors) (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Neural Network	BCM8T23	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Neural Network	BCM8P23	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Cloud Computing	BCM8T24	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Cloud Computing	BCM8P24	-	-	2	1	-	-	-	-	-	50	25
5	DSC	R-Programming	BCM8T25	2	-	-	2	3	80	20	40	-	-	-
6	DSC	R-Programming	BCM8P25	-	-	2	1	-	-	-	-	25	25	25
7	DSC	Computer Graphics	BCM8T26	2	-	-	2	3	80	20	40	-	-	-
8	DSC	Computer Graphics	BCM8P26	-	-	2	1	-	-	-	-	-	50	25
9	DSE	Elective 4	BCM8T27	2	-	-	2	3	80	20	40	-	-	-
10	DSE	Elective 4	BCM8P27	-	-	2	1	-	-	-	-	25	25	25
11	OJT	Apprenticeship (Related to DSC)	BOJ8P02	-	-	8	4	-	-	-	-	100	100	100
Total				11	-	18	**20**		**440**	**110**		**175**	**275**	

B.Sc. Sem-VII (Research) (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Artificial Intelligence	BCM7T17R	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Artificial Intelligence	BCM7P17R	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Data Warehousing	BCM7T18R	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Data Warehousing	BCM7P18R	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Python Programming	BCM7T19R	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Python Programming	BCM7P19R	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 3	BCM7T20R	2	-	-	2	3	80	20	40	-	-	-
8	DSE	Elective 3	BCM7P20R	-	-	2	1	-	-	-	-	-	50	25
9	RM	Research Methodology	BCM7T21R	2	-	-	2	3	80	20	40	-	-	-
10	RM	Research Methodology	BCM7P21R	-	-	2	1	-	-	-	-	50	50	50
11	RP	Research Project/ Dissertation (Core)	BRP7P01	-	-	6	3	-	-	-	-	75	75	75
Total				11	-	18	**20**		**440**	**110**		**175**	**275**	

'R' in the subject code indicates 'Research'.

B.Sc. Sem-VIII (Research) (Computer Application - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min	SEE	CIE	Min
1	DSC	Neural Network	BCM8T22R	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Neural Network	BCM8P22R	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Cloud Computing	BCM8T23R	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Cloud Computing	BCM8P23R	-	-	2	1	-	-	-	-	-	50	25
5	DSC	R-Programming	BCM8T24R	2	-	-	2	3	80	20	40	-	-	-
6	DSC	R-Programming	BCM8P24R	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 4	BCM8T25R	2	-	-	2	3	80	20	40	-	-	-
8	DSE	Elective 4	BCM8P25R	-	-	2	1	-	-	-	-	-	50	25
9	RP	Research Project / Dissertation (Core)	BRP8P02	-	-	14	7 (4+2+1)	-	-	-	-	175	175	175
Total				09	-	22	**20**		**360**	**90**		**225**	**325**	

'R' in the subject code indicates 'Research'.

Total Credits:

1. Three Year UG Degree Program: 132
2. Four Year UG Degree Program: 172

Abbreviations: Generic/Open Electives: OE, Vocational Skills & Skill Enhancement Courses: VSEC, Vocational Skill Courses: VSC, Skill Enhancement Courses: SEC, Ability Enhancement Courses: AEC, Indian Knowledge Systems: IKS, Value Education Courses: VEC, On Job Training (Internship/Apprenticeship): OJT, Field Project: FP, Community Engagement & Service: CEP, Co-curricular Courses: CC, Research Methodology: RM, Research Project: RP

VSC Basket (Computer Application)

Semester	Course Category	Name of Course	BoS	Course Code
I	**VSC**	Office Automation	Computer Science	**BVS1P01**
II	**VSC**	Computer Animation	Computer Science	**BVS2P03**
III	**VSC**	Web design using HTML and DHTML	Computer Science	**BVS3P05**
V	**VSC**	Web Development using Java	Computer Science	**BVS5P07**
VI	**VSC**	Shell Programming	Computer Science	**BVS6P08**

Basket for <u>ELECTIVE</u> (DSE) Category Courses (Computer Application)

Semester	Course Category	Name of Course	Course Code
V	Elective 1	A. Discrete Mathematics	BCM5T12
		B. Web Technology	
VI	Elective 2	A. ASP.NET	BCMT16
		B. E-Commerce	
VII (Honors)	Elective 3	A. Embedded System	BCM7T21
		B. Digital Electronics and Microprocessor	
VIII (Honors)	Elective 4	A. Computer Architecture and Organization	BCM8T27
		B. PHP	
VII (Research)	Elective 3	A. Internet of Things	BCM7T20R
		B. Soft Computing	
VIII (Research)	Elective 4	A. Digital Image Processing	BCM7T25R
		B. Data Mining	

'R' in the subject code indicates 'Research'.

Bachelor of Science (Honors/Research)
(Computer Application - Major)
Four Year (Eight Semester Degree Course)

The objectives of the Program

1. The primary objective of this program is to provide a foundation of computing principles for effectively using information systems and enterprise softwares.

2. It helps students analyze the requirements for system programming and exposes students for information systems

3. This programme provides students with options to specialize in various software system.

4. To produce outstanding Computer Scientists who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves

5. To provide opportunity for the study of modern methods of information processing and its applications.

6. To develop among students the programming techniques and the problem solving skills through programming

7. To prepare students who wish to go on to further studies in computer science and related subjects.

8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. Discipline knowledge: Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity

2. Problem Solving: Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.

3. Design and Development of Solutions: Ability to design and development of algorithmic solutions to real world problems.

4. Programming a computer: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day scientific applications.

5. Application Systems Knowledge: Possessing a minimum knowledge to practice existing computer application software.

6. Communication: Must have a reasonably good communication knowledge both in oral and writing.

7. Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the integrity in a working environment and also have concern on societal impacts due to computer-based solutions for problems.

8. Lifelong Learning: Should become an independent learner. So, learn to learn ability.

9. Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

B.Sc. Sem-I (Computer Application - Major)
SC-DSC (Paper I)
BCM1T01

PROGRAMMING IN 'C'

Credits : 2 **Duration : 30 Hours**

Course Objectives:

1.To formulate simple algorithms for arithmetic and logical problems.
2.To translate the algorithms to programs (in C language).
3.To test and execute the programs and correct syntax and logical errors.
4.To implement conditional branching, iteration and recursion.
5. To implement operations on arrays, strings , structures, unions , functions and file handling.

Course Outcomes :

After completing this course satisfactorily, a student will be able to:
1. Write simple algorithms for arithmetic and logical problems.
2. Write the C code for a given problem
3. Perform input and output operations using programs in C
4. Write programs that perform operations on arrays, strings , structures, unions , functions and file handling.

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: Unions, Differences between Structure and Union
Pointer: Introduction, Address Operator (&), Pointer variables, void pointers, Pointer Arithmetic, Pointers to Pointers.

File handling: Hierarchy of File Stream Classes, Opening & closing a file, Testing for errors, File Modes, File pointers and their manipulations, Sequential Access, Random Access, Command Line arguments.

Books

1. The Art of programming through flowcharts & algorithm by Anil B. Chaudhari Firewall Media, Laxmi publication, New Publication.
2. Programming in C by E. Balagurusamy TMH Publications.
3. C Programming – KernighenRitche
4. Programming with C – Y. Kanetkar.
5. C Programming – Holzner, PHI Publication.
6. Programming in C – Ravichandran.

B.Sc. Sem-I (Computer Application - Major)
SC- DSC (Paper II)
BCM1T02

COMPUTER FUNDAMENTALS

Credits : 2 **Duration : 30 Hours**

Course Objectives:

1.To understand the basic digital components of computer.
2.To understand the working of peripheral devices.
3.To understand the number systems and logical gates.
4.To understand the network topologies.

Course Outcomes :

After completing this course satisfactorily, a student will be able to:

1.Confidently operate computers to carry out computational tasks
2.Understand working of Hardware and Software and the importance of operating systems
3.Understand number systems, peripheral devices, networking, multimedia and internet concepts

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 gates.
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.

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 Micropocessor by B Ram

B.Sc. Sem-I (Computer Application)

OFFICE AUTOMATION (BVS1P01)

Credits : 2 **Duration : 60 Hours**

Course Objectives:

1.To understand functionality of Operating Systems and its applications.
2.To understand the working with the user interface.
3.To understand Word Processing, their usage, details of word processing screen, Opening, saving and printing a document
4.To understand Worksheet creation, inserting and editing data in cells..

Course Outcomes :

After completing this course satisfactorily, a student will be able to:
1. understand functionality of Operating Systems and its applications.
2. Working with the user interface.
3. prepare documents, letters and do necessary formatting of the document.
4. Worksheet creation, inserting and editing data in cells.
5. 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 ExcelROUND( ), 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.

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 – I

BVE1T01: ENVIRONMENTAL SCIENCE

COURSE OUTCOMES:

At the end of the course, students shall be able to:

- Explain the basics of Environmental Science and Atmospheric Science along-with the components of Environment
- Explicate the importance of Environmental Education.
- Elucidate the fundamentals of atmospheric science including formation, depletion and effects of ozone layer and acid rain on environment.
- Describe the various physical and chemical characteristics and properties of Water and Soil
- Understand the Ecology and its allied branches
- Comprehend about Population and Community Ecology
- Study the changes in Population by understanding the concept of Population ecology

Unit-I: Basics of Environmental Science (7.5 Hrs)

A. Introduction of Environmental Science: Definition, Types, Classification, Characteristics, Components and principles of environment. Scope and need for environmental science, Multidisciplinary nature of environmental science, Environmental ethics.
B. Environmental Education: Goals, Objectives and principles of environmental education, formal and non-formal environmental education, environmental program, importance of environmental education, environmental awareness.
C. Components of Environment: Atmosphere (Structure and composition), hydrosphere – distribution of water, hydrological cycle, global water balance, lithosphere – Internal structure of Earth, types of rocks, Biosphere- Boundaries of biosphere.

Unit-II: Basics of Atmospheric Science (7.5 Hrs)

A. Atmospheric Chemistry: Structure of atmosphere based on temperature, photochemical reaction in the atmosphere, temperature inversion and lapse rate, smog formation, types of smog (sulphur and photochemical smog), adverse effect of smog on human being, aerosol.
B. Green House Effect: Greenhouse gases, relative contribution and effects of greenhouse effect, control of greenhouse gases. Ozone depletion: chemistry of ozone depletion, Dobson Unit, ozone depleting substances (ODS), ozone hole, consequences of ozone depletion, mitigation measures and international protocols.
C. Acid Rain: Chemistry of Acid Rain, effect of acid rain on ecosystem, control measures. Precipitation – Forms of precipitation (rain, drizzle, snow, sleet, and hail), types of precipitation (conventional, orographic, and cyclonic).

Unit-III: Basics of Ecology (7.5 Hrs)

A. Ecology: Definition, subdivision and modern branches of ecology, ecology spectrum, scope of ecology. Application and significance of ecology to human beings.
B. Abiotic Factors: Temperature: effect of temperature on plants and animals, Adaptation to meet extreme temperature. Light: Zonation in marine habitat, effects of light on plants and animals, Microclimate and fire, Shelford law of tolerance, Leibigs law of minimum.
C. Biotic Factor: Inter specific relationship Positive: Mutualism (symbiosis), commensalism, proto- cooperation Negative: Parasitism, predation, competition, Antibiosis, Neutralism.

Unit-IV: Ecosystems and food chain (7.5 Hrs)

A. Ecosystem: Definition, structure and function of ecosystem, types of ecosystems: Terrestrial (forest, grassland, desert, cropland), Aquatic (Marine and freshwater)
B. Food chain: Definition & types: Grazing food chain, detritus food chain, and parasitic food chain, food web in forest and grassland ecosystem. Ecological pyramids (number biomass and energy), energy flow in ecosystem (Y- shaped). Energy flow and the law of thermodynamics.
C. Biogeochemical Cycles: Definition, classification, gaseous cycle (oxygen, carbon and nitrogen) Sedimentary cycle (phosphorus and sulphur).

Reference Books:

1. Text Book of Environment: K M Agrawal, P.K. Sikdar, and S.C. Deb, Mc'Millan Publication, Mumbai.
2. Man and Environment: M.C. Dash and P.C. Mishra, Mc'Millan Publication, Mumbai.
3. Environmental Science: S.C. Santra, New Central Book Pvt.Ltd, Kolkatta.
4. Environmental Problems and Solution: D.K. Asthana, S.Chand Publication, New Delhi.
5. Environmental Chemistry: S.S. Dara, S.Chand Publication ,New Delhi.
6. Environmental Chemistry: A.K. Dey, New Age International Publishers,2001.
7. A Textbook of Environmental Studies: Dr S.Satyanarayan, Dr S.Zade, Dr S Sitre and Dr **P.U. Meshram, Allied Publishers, New Delhi.**
8. Environmental Biology: Biswarup Mukherjee, Tata McGraw-Hill Publishing Company Ltd, New Delhi,1996.
9. Animal Ecology and Distribution of Animals: Veer Bala Rastogi , Rastogi Publication, Meerut (U.P).
10. Ecology and Environment: P.D.Sharma, Rastogi Publication ,Meerut (U.P).
11. Fundamentals of Environmental Biology: S. Arora, Kalyani Publishers.
12. Environmental Biology: P.K.G. Nair, Himalaya Publication.
13. Environmental Biology: K.C. Agrawal, Agro Botanical Publisher ,Bikaner,1994

Indian Knowledge System (IKS)

SEM1: VEDIC MATHEMATICS (BIK1T01)

Course Outcomes: This course will enable the students to

1. Improve speed and accuracy in numerical calculations
2. Acquire IQ skills and high-end technical knowledge
3. gain test taking skills & creativity of calculations

UNITS	TOPICS	HOURS
Unit 1	(i)Addition - Subtraction - Combined operations - Beejank (ii) Multiplication methods: Urdhwatiryagbhayam, Nikhilam, Ekanyunen, Ekadhiken, Antyayordashakepi. (iii) Vinculum - Operations. (iv) Awareness of 1 to 5 Vedic sutras as per Shankaracharya Bharthikrishan Teerthji Swamiji's book.	**8**
Unit 2	(i) Division methods : Nikhilam, Paravartya Yojayet, Dhwajank(ii) GCD and LCM (iii) Expression of GCD in terms of two numbers.	**8**
Unit 3	(i) Divisibility tests, Osculation & Reverse osculation. (ii) Division Algorithm, Quotient & Remainder. (iii) Duplex method.	**7**
Unit 4	i) Squares & Square-roots for 6 digit number. (ii) Cubes & Cube-roots for 6 digit number, Contribution of Indian Mathematicians in Arithmetic.	**7**
	TOTAL	**30 HRS**

Reference Books:

1. Tirthaji B.K. (1965) Vedic Mathematics, MotilalBanarsidass
2. Bidder G.P. (1856) On Mental Calculation. Minutes of Proceedings, Institution ofCivil Engineers (1855-56), 15, 251-280
3. Scripture E.W. (1891) American Journal of Psychology. Vol. IV 1-59
4. Mitchell F.D. (1907) American Journal of Psychology. Vol. XVIII 61-143
5. Aitken A.C. (1954) The Art of Mental Calculation: With Demonstrations. Transactions of the Society of Engineers. 45, 295-309
6. Dow A. (1991) A Unified Approach to Developing Intuition in Mathematics, Scientific Research on the Transcendental Meditation and TM-Sidhi Program Vol 5,3386-3398
7. Williams K.R. (1984) Discover Vedic Mathematics. Vedic Mathematics Research Group
8. Nicholas, Williams, Pickles (1984) Vertically and Crosswise. Inspiration Books

B.Sc. Sem -II (Computer Application - Major)
SC- DSC (Paper I)
BCM2T03

OBJECT ORIENTED PROGRAMMING USING 'C++'

Credits : 2 **Duration : 30 Hours**

Course Objectives:

1. To provide basic characteristics of OOP through C++.
2. To impart skills on various kinds of overloading and inheritance.
3. To introduce pointers and file handling in C++ together with exception handling mechanism.

Course Outcomes:

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

1. Realize the need and 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. Handle pointers and effective memory management.
5. 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.

Books

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. Sem -II (Computer Application - Major)

SC- DSC (Paper II)
BCM2T04

DATA STRUCTURES

Credits : 2 **Duration : 30 Hours**

Course Objectives:

1. To provide basics of data representation.
2. To understand various types of data structures and its implementation.
3. To understand application of data structures on sorting and searching methods.

Course Outcomes:

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

1. Implement linked list data structure and its algorithms.
2. Implement stack data structure and its application in sorting method.
3. Implement Queue data structure.
4. Implement sorting and searching method.
5. Implement Tree and Graph structure.

UNIT I

Linked List: Linked List, Representation of Single, Double, Header, Circular Single and Double Linked list, All possible operations on Single and Double linked List using Dynamic representation, Polynomial Representation and its Manipulation.

UNIT II

Stacks: Stacks terminology, Representation of Stacks in Memory, Operation on Stacks, Polish Notations, Translation of infix to postfix & prefix expression, Infix to Postfix Conversion, Evaluation of Postfix Expression, Recursion, Problems on Recursion, Quick Sort and Tower of Hanoi Problem.

UNIT III

Queue: Representation of Queues in Memory, Circular Queue, Dequeue and Priority Queue. Operations of above Structure using Array and Linked Representation. **Sorting and Searching:** Selection Sort, Insertion Sort, Merge Sort, Efficiency of Sorting Methods, Big-O Notations. Hash Tables, Hashing Technique, Collision Resolution Technique.

UNIT IV

Trees: Basic Terminologies, Representation of Binary Trees in Memory, Traversing of Binary tree, Binary Search Tree, Operation on Binary Search Tree, Heap Tree, Operation on Heap Tree, Heap Sort Method

Graphs: Basic Terminologies, Definition and Representation of Graphs in Memory: Linked List and Matrix Representation. Traversing graphs: BSF, DFS Method.

Text Books

1. Classical Data Structures: D. Samanta, PHI, New Delhi.
2. Data Structure: Schaum Lipschutz, Outline Series

Reference Books

1. Data structure Using C++: Y. Kanetkar
2. Data Structures Using C++: Tanenbaum
3. Data structures by Tremblay Sorenson
4. Data structures by Bhagatsingh Naps

B.Sc. Sem-II (Computer Application)
BVS2P03
COMPUTER ANIMATION

Credits : 2 **Duration : 60 Hours**

Course Objectives:

1. To Understand the concept of 2D and 3D Animation.
2. To Execute creative concepts and ideas through a variety and combination of techniques including hand drawn, computer generated, 2D and 3D storyboards and animatics.
3. To Understand how animation works.
4. To Understand the basic concepts of multimedia technology which will help them to get started easily in multimedia.

Course Outcome: After completion of this course, students will be able to:
1. Get knowledge about various terms like, images, text, fonts, file formats. Understanding these things is very necessary.
2. produce traditional style animation as well as puppet animation and the knowledge of the principles of animation to be built upon in subsequent courses leading up to the Portfolio course.
3. apply skills learned in this class in other areas including motion graphics, stop motion and basic traditional animation

Unit I
Animation, Introduction to 2D and 3D Animation. Advantages of animation, Different tools of 2D Animation.
GIMP Features and Capabilities, Toolbox, Image Window, Dialog and Docking, Working with images,
Pencil2D , Overview of Pencil2D, Traditional Animation Workflows, How to rotate image, Scrolling background in Camera layer

Unit II
Opentoonz , Production Workflow, Interface Overview, Managing Projects,Setting Up a Scene, Scanning Paper Drawings, Cleaning-up Scanned Drawings, Drawing Animation Levels, Editing Animation Levels, Managing Palettes and Styles, Painting Animation Levels, Working in Xsheet/Timeline, Creating Movements, Editing Using Spreadsheet and Curves, Creating Cutout Animation, Create animations using Plastic tool, Applying Effects, Using the Particles Effect, Previewing and Rendering

Unit III
Blender, History and Installation, Interface : Blender Interface, Adding New Objects, Moving Things Around, Modeling : Mesh, Edit Mode, Sculpt Mode, Retopology
Lighting and Procedural Textures : Setting Up a Basic Scene, The Scene Camera, Procedural Materials and Textures., UV Mapping : Creating a UV Map, Texture Painting, Projection Painting, Normal Maps and Bump Maps
Curves and NURBS : Metaballs, Curves, Spins, Nurbs,

Unit IV

Basic Rigging and Animation : Keyframing with the Timeline, The Dopesheet ., Parenting, Graph Editor, Pivot Point: The Center of Rotation, Basic Tracking: Eyes That Follow, Rigging with Bones, Rigging a Simple Character, Advanced Rigging ..: Forward Kinematics vs. Inverse Kinetics, Blender 2.5 Rigs, Walk Cycles., Shape Keys, Lip Syncing.

Making Movies : Disabling, Color Management, Rendering Formats, Alpha, Lighting Adjustments, The Video Sequence Editor, Crash Management and Rendering Speed, Introduction to Game Engine.

Books :

https://docs.gimp.org/odftest/en.pdf

https://opentoonz.readthedocs.io/en/latest/using_the_toonz_farm.html

https://www.pencil2d.org/doc/tutorials

Beginning Blender Open Source 3D Modelling, Animation, and Game Design, Lance Flavell, Apress.

https://www.academia.edu/7984869/Beginning_Blender_Open_Source_3D_Modeling_Animation_and_Game_Design_Companion_eBook_Available_Full_Color_Inside_BOOKS_FOR_PROFESSIONALS_BY_PROFESSIONALS_Beginning_Blender_Open_Source_3D_Modeling_Animation_and_Game_Design

Reference Book :

Learning Blender A Hands-On Guide to Creating 3D Animated Characters, Oliver Villar

Blender Basics Classroom Tutorial Book 4th Edition, James Chronister. https://www.cdschools.org/cms/lib04/pa09000075/centricity/domain/81/blenderbasics_4thedition2011.pdf

Blender 3D Basics Beginner's Guide: A quick and easy-to-use guide to create 3D modeling and animation using Blender 2.7, Gordon Fisher

SEM 2 : CONSTITUION OF INDIA (BVE2T02)

Syllabus

UNIT – I:

- Historical Background to the Framing of the Indian Constitution: General Idea about the Constituent Assembly of India.

UNIT – II

- Preamble – Nature and key concepts/Constitutional values, Socialism, Secularism, Democracy, Justice, Liberty, Equality and Fraternity

- Salient Features of the Constitution of India

UNIT – III

- General study about the kinds, nature and importance of; Fundamental Rights, Directive Principles of State Policy and Fundamental Duties.

UNIT –IV

Introduction of the Constitutional Institutions and Authorities;

- Central Legislature and Executive (Parliament of India, President of India and Council of Ministers)
- State Legislature and Executive (State legislative Assemblies, Governors and Council of Ministers)
- Higher Judiciary (Supreme Court of India and High Courts)

Indian Knowledge System (IKS)

SEM2: INDIAN ASTRONOMY (BIK2T02)

Course Outcomes: This course will enable the students to understand that

1. It is possible to create a map of the intellectual growth of a culture usingastronomy as a probe.
2. The growth of Indian astronomy occurs in distinct stages analogous to phasetransitions of the evolution of cultures
3. Indian Astronomy therefore provides an excellent window to the pastdramatic transitions.

UNITS	TOPICS	HOURS
Unit 1	Astronomy in Prehistoric Era, Astronomy in Vedic Era, Vedang Jyotish, Astronomical References In Religious Scriptures, Astronomies of the West	**8**
Unit 2	Arya Bhatta, Panch Siddhantika of Varahamihira, Surya Siddhanta Varahamihira to Bhaskar Acharya-II, Siddhant Shiromani of Bhaskar Acharya-II, Bhaskar Acharya-II to Jai Singh, Jai Singh and his Observatories.	**8**
Unit 3	After Jai Singh, Interaction with the Astronomies of the World, Modern Era Astronomy , Our Universe, Cosmology	**7**
Unit 4	Panchang Horoscope and Astrology , Siddhantas, Karnas and Koshtakas, Observational Instruments of Indian Astronomy	**7**
	TOTAL	**30 HRS**

Reference Books:

1. The Story Of Astronomy In India, Chander Mohan, Pothi.com
2. Indian Astronomy: An Introduction. Front Cover · S. Balachandra Rao.Universities Press, 2000
3. Astronomy in India: A Historical Perspective, Thanu Padmanabhan,Springer Science & Business Media
4. Hindu Astronomy, W. Brennand, Alpha Editions
5. Origin and Growth of Astronomy in India, https://www.tifr.res.in/~archaeo/FOP/FOP%20pdf%20of%20ppt/Vahia%20Origin% 20of%20Astronomy.pdf