

**FOUR YEAR UNDER-GRADUATE PROGRAMME (FYUGP)**

**COOCH BEHAR PANCHANAN BARMA  
UNIVERSITY**

**DEPARTMENT OF COMPUTER SCIENCE**

**UNDERGRADUATE PROGRAMME  
(Courses effective from Academic Year 2023-24)**



**SYLLABUS OF COURSES TO BE OFFERED**

**Major, Minor & MDC**

**Disclaimer:** The **FYUGP** syllabus is uploaded as given by the Faculty concerned to the Academic Council. The same has been approved as it is by the Academic Council on 01.08.2023. Any query may kindly be addressed to the concerned Faculty.

**Undergraduate Programme Secretariat**

## **Preamble**

The University Grants Commission (UGC) has initiated several measures to bring equity, efficiency and excellence in the Higher Education System of country. The important measures taken to enhance academic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters.

The UGC has formulated various regulations and guidelines from time to time to improve the higher education system and maintain minimum standards and quality across the Higher Educational Institutions (HEIs) in India. The academic reforms recommended by the UGC in the recent past have led to overall improvement in the higher education system. However, due to lot of diversity in the system of higher education, there are multiple approaches followed by universities towards examination, evaluation and grading system. While the HEIs must have the flexibility and freedom in designing the examination and evaluation methods that best fits the curriculum, syllabi and teaching-learning methods, there is a need to devise a sensible system for awarding the grades based on the performance of students. Presently the performance of the students is reported using the conventional system of marks secured in the examinations or grades or both. The conversion from marks to letter grades and the letter grades used vary widely across the HEIs in the country. This creates difficulty for the academia and the employers to understand and infer the performance of the students graduating from different universities and colleges based on grades.

The grading system is considered to be better than the conventional marks system and hence it has been followed in the top institutions in India and abroad. So it is desirable to introduce uniform grading system. This will facilitate student mobility across institutions within and across countries and also enable potential employers to assess the performance of students. To bring in the desired uniformity, in grading system and method for computing the cumulative grade point average (CGPA) based on the performance of students in the examinations, the UGC has formulated these guidelines.

**FOUR YEAR UNDER-GRADUATE PROGRAMME (FYUGP)**  
**IN**  
**COMPUTER SCIENCE,**  
**COOCH BEHAR PANCHANAN BARMA UNIVERSITY**

**INTRODUCTION:**

The introduction of the National Education Policy (NEP) 2020 has been one of the biggest highlights in the Indian education system. It is a comprehensive policy that emphasises multidisciplinary & multimode approaches, and education backed by Technology. The NEP has transformed the administrative structure of the educational system in India. It focuses on skill development in order to help students succeed in life. Keeping in mind the NEP 2020, Commerce education, with continuous revision of the curriculum will develop the creative potential of each individual and create new career growth opportunities. The Bachelor of Commerce Degree of Cooch Behar Panchanan University adapted as per the recommendations of NEP 2020 is of either three or four-years duration with multiple entry/exit options within the period with appropriate certification/diploma/degree. Introducing holistic and multi-disciplinary under-graduate education that would develop all capacities of human beings- intellectual, aesthetic, social, physical, emotional, ethical in an integrated manner.

**AIMS OF FOUR YEAR UNDER-GRADUATE PROGRAMME (FYUGP) IN COMPUTER SCIENCE:**

The aims of Four Year Under-Graduate Programme (FYUGP) in Computer Science are:

1. To equip students with practical and hands-on skills required in software industry, human relations and many other sub disciplines of computer sciences so as to ensure their place in the job market and in practice.
2. To acquaint the students with the basic and advanced concepts and theories of various computer science subjects aimed at building a solid base for higher learning, research and practice.
3. To develop capabilities of the students to critically evaluate issues and the emerging trends influencing the field of Computer Science.
4. To familiarize students with the changes evidenced in the use of technology in modern trade and e-commerce in general and more specifically in the practices of each of the sub-disciplines
5. To acquaint the students in recent developments in the fields of software industry, e-commerce and thereby, to encourage entrepreneurial spirit in them to go for their own start-ups.
- 6.

## **Programme Learning Outcomes:**

**Upon completion of the program, graduates will be able to:**

1. Design, develop, and maintain computer systems and software applications using various programming languages and tools.
2. Develop and manage database management systems.
3. Develop and implement computer networks.
4. Analyze algorithms and data structures.
5. Develop and implement cloud computing solutions.
6. Develop and implement artificial intelligence solutions.
7. Apply mathematical and computational thinking and analysis to solve computer science problems.
8. Understand and analyze ethical and professional issues related to computer science.
9. Communicate effectively with team members and stakeholders.
10. Continuously update their knowledge and skills in the rapidly evolving field of computer science.

## CBPBU\_ NCCF\_ Course Structure\_2023-24

1ST YR				2ND YR				3RD YR				4TH YR				4TH YR (WITH RESEARCH)			
1ST SEM	C	2ND SEM	C	3RD SEM	C	4TH SEM	C	5TH SEM	C	6TH SEM	C	7TH SEM	C	8TH SEM	C	7TH SEM	C	8TH SEM	C
Major-1	6	Major-2	6	Major-3	6	Major-5	6	Major-7	6	Major-10	6	Major-13	6	Major-17	6	Major-13	6	Major-16	6
Minor-1	6	Minor-2	6	Major-4	6	Major-6	6	Major-8	6	Major-11	6	Major-14	6	Major-18	6	Major-14	6	Major-17	6
MDC-1	3	VAC-1	3	Minor-3	6	Minor-4	6	Major-9	6	Major-12	6	Minor-5	6	Minor-6	6	Major-15	6	Minor-6	6
SEC-1	3	SEC-2	3	SEC-3	3	AEC-2	4	MDC-3	3	VAC-2	3	Major-15	6	Major-19	6	Minor-5	6	Research-2	6
AEC-1	4	INTRN	4	MDC-2	3							Major-16	6			Research-1			
	22		22		24		22		21		21		30		24		24		24
		44				46				42				54				48	
132 (3 Year)																			
186 (4 Year)																			
186 (4 Year with Research)																			

➤ **DISCIPLINARY MAJOR (HONOUS SUBJECT) = Major (MAJOR)**

*It is the discipline or subject of main focus and the degree will be awarded in that discipline. Students should secure the prescribed number of credits (about 50% of total credits) through core courses in the major discipline.*

- **16 Major papers (2 in 1<sup>st</sup> year, 4 in 2<sup>nd</sup> year, 6 in 3<sup>rd</sup> year, 4 in 4<sup>th</sup> year) & additional 3 Major papers, only for those who will not take Research paper in 4<sup>th</sup> year.**

**Thus, 4Year UG Degree with Research will have 16 Major subjects & 4Year UG Degree without Research will have 19 Major subjects**

➤ **MINOR= Minor (MINOR)- To gain a broader understanding beyond the major discipline**  
**Students need to choose any two Minor Discipline/Subjects, each comprising of 3 papers (Two Minors in 1<sup>st</sup> year, two in 2<sup>nd</sup> Year and two in 4<sup>th</sup> Year)**

- **Each Minor discipline will have 3 papers, follow the below mentioned minor subject combinations:**

**Minor subject combinations for Science Discipline**

**1. Computer Science (Major):- Minors:- (i) Mathematics(1<sup>st</sup>, 2<sup>nd</sup> and 7<sup>th</sup> semester) (ii) Physics or Chemistry(3<sup>rd</sup>, 4<sup>th</sup> and 8<sup>th</sup> semester)**

**[A candidate pursuing Major in a subject will not be allowed to take up the same subject as Minor.**

➤ **MULTIDISCIPLINARY COURSE= 3 MDC papers; MDC-1 (1<sup>st</sup> Semester), MDC-2 (3<sup>rd</sup> Semester), MDC-3 (5<sup>th</sup> Semester)**

Students have to choose any one disciplines as MDC, which should not be similar to their major or minor or even any subject which they had in their Higher Secondary. For each Discipline there will be one MDC.

- **ABILITY ENHANCEMENT COURSES= AEC (two AEC papers; one in 1<sup>st</sup> Semester & one in 4<sup>th</sup> Semester)- language focussed on language and communication skills**

**Modern English Language (MIL)-Bengali or Hindi or Sanskrit or Alternative English in 1<sup>st</sup> Semester & Basics in English in 4<sup>th</sup> Semester**

- **SKILL ENHANCEMENT COURSES= SEC(three SEC courses; each SEC subject will have 3 papers, each in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> semester)**

These courses are aimed at imparting practical skills, hands-on training, soft skills, etc., to enhance the employability of students.

**Subjects: Spoken English; Soft Skill; Basic computing; Video & Photography Editing; Professional Ethics; Medical Pathology, Aquarium Fish Keeping & Management, Poultry Breeding; Tourism, Wild Life Conservation & Management, Bhawaiya; Folk & Creative Dance; Tailoring & Designing; Beauty and Wellness; Electronic Repairing; Baking; Gardening; Organic Farming; Proof Reading (Bengali), Recitation, Theatre; Stress Counselling & Management; GST Filing, Hospitality Management; Office Administration; Proof Reading (English); Interior Designing; Green Chemistry [ Any person having professional skill to train students irrespective of his/her educational qualifications can teach SEC courses]**

**Each student has to choose any one SEC subject comprising of three papers in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> semester.**

- **VALUE ADDED COURSE (Common for all UG) = VAC(2 VAC Papers common to all)**

**VAC-1:** Environmental Studies (emphasis on management & sustainable development)

**VAC-2:** Constitution of India and Health & Wellness [Gr-A-Constitution of India (emphasis on values, fundamental rights & duties) and Gr-B-Health & Wellness (emphasis on physical, social, intellectual, spiritual and mental wellbeing)]

- **INTERNSHIP (INTRN): (To be carried out at 2<sup>nd</sup> semester)**

A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of internship is induction into actual work situations. All students will also undergo internships in a firm, industry, or organization or training in labs with faculty and researchers in their own or other HEIs/research institutions during the summer term. **NSS activities (apart from Regular/ Special NSS activities) may also be considered in the Internship during summer term.**

- **RESEARCH PROJECT/DISSERTATION= RESEARCH (2 Research papers, one at each 7<sup>th</sup> and 8<sup>th</sup> semester)**

## TEACHING LEARNING PROCESS:

The programme allows to use varied pedagogical methods and techniques both within classroom and beyond.

- Lecture
- Tutorial
- Power point presentation
- Project Work/Dissertation
- Group Discussion
- Seminars/conferences
- Field and industry visits and Report/Excursions
- Mentoring and Counselling
- Micro Teaching
- Case Study
- Role Playing
- Workshops/Hands-on learning

## TEACHING LEARNING TOOLS:

- Smart Boards
- Desktop Computers with latest Commerce Related Softwares
- Projector
- LCD Monitor
- WLAN
- White/Green/Black Board

## ASSESSMENT TECHNIQUES:

- Home Assignment
- Class Assignments
- Group Discussions
- Field Tour/Industrial Visit
- Seminars
  
- Project Report
- Class Presentation: Oral/Poster/Power point
- In semester examinations
- End Semester examinations

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UNIVERSITY, COOCH BEHAR-736101, WEST  
BENGAL, INDIA**

**FYUGP Structure as per UGC Credit Framework of December, 2023**

Year	Semester	Course	Title of the Course	Total Credit	
<b>Year 01</b>	1 <sup>st</sup> Semester	<b>Major-1</b>	Computer Fundamental & Digital Logic	4	
			Computer Fundamental & Digital Logic LAB	2	
		<b>Minor 1</b>	Mathematics	6	
		<b>MDC-1</b>	MDC-1	3	
		<b>SEC1</b>	SEC-1	3	
		<b>AEC1</b>	Bengali or Hindi or Sanskrit or Alternative English	4	
					22
	2 <sup>nd</sup> Semester	<b>Major-2</b>	Introduction to Programming using C	4	
			Introduction to Programming using C LAB	2	
		<b>Minor 2</b>	Mathematics	6	
		<b>VAC1</b>	Environmental Studies	3	
		<b>SEC2</b>	SEC-2	3	
		<b>Internship</b>		4	
				22	
<b>The students on exit shall be awarded Undergraduate Certificate (COMPUTER SCIENCE) after securing the requisite 44 Credits in Semester 1 and 2 provided they secure 4 credits in work based vocational courses offered during summer term or internship / Apprenticeship in addition to 6 credits from skill based courses earned during 1st and 2nd Semester</b>					
<b>Year 02</b>	3 <sup>rd</sup> Semester	<b>Major-3</b>	Data Structure & Algorithm	4	
			Data Structure & Algorithm LAB	2	
		<b>Major-4</b>	Computer Organization & Architecture	6	
		<b>Minor- 3</b>	Physics or Chemistry	6	
		<b>MDC-3</b>		3	
		<b>SEC-3</b>		3	
					24
	4 <sup>th</sup> Semester	<b>Major-5</b>	Design and Analysis of Algorithms	6	
		<b>Major-6</b>	Introduction to Programming using Python LAB	6	
<b>Minor 4</b>		Physics or Chemistry	6		
<b>AECC-2</b>		Basics in English	4		
				22	
<b>Grand Total (Semester I, II,III and IV)</b>				<b>88</b>	
<b>The students on exit shall be awarded Undergraduate Diploma (Computer Science) after securing the requisite 88 Credits on completion of Semester IV provided they secure additional 4 credit in skill based vocational courses offered during First Year or Second Year summer term</b>					



Note: -

Abbreviations Used:

- C = Core/Major
- MDC = Multi Disciplinary Course
- AEC = Ability Enhancement Course
- SEC = Skill Enhancement Course
- VAC = Value Added Course

**General Information and Guidelines:**

1. L = Lecture, T = Tutorial and P = Practical

2. Distribution of Marks for Major/Minor :

End Semester Examination	75
Continuous Evaluation	10
Assignments	10
Attendance	05
Total	100

3. Distribution of Marks for Major/Minor :

End Semester Examination	35
Continuous Evaluation	10
Attendance	05
Total	50

4. **Modes of Continuous Evaluation:** The department or faculty concern can chose any method or any combination of the following options: \_

- One Sessional Examination -
- Group Discussion
- Assignment
- Seminar Presentation on any of the relevant topics
- Micro Teaching

**Note:** Universities may include more options or delete some from this list **Important:**

1. **Each University/Institute should provide a brief write-up about each paper outlining the salient features, utility, learning objectives and prerequisites.**
2. **University/Institute can add/delete some experiments of similar nature in the Laboratorypapers.**
3. **The size of the practical group for practical papers is recommended to be10-15 students.**
4. **The size of tutorial group for papers without practical is recommended to be 8-10 students.**

University/Institute can add to the list of reference books given at the end of each paper.

**DISCIPLINARY MAJOR (HONOUS SUBJECT) = Major (MAJOR) : (Credit: 06 each)**

**16 Major papers (2 in 1<sup>st</sup> year, 4 in 2<sup>nd</sup> year, 6 in 3<sup>rd</sup> year, 4 in 4<sup>th</sup> year) & additional 3 Major papers, only for those who will not take Research paper in 4<sup>th</sup> year.**

**Thus, 4Year UG Degree with Research will have 16 Major subjects & 4Year UG Degree without Research will have 19 Major subjects**

**List of Papers :**

1. Major-1 Computer Fundamentals and Digital Logic
2. Major-2 Introduction to Programming using C
3. Major-3 Data Structure & Algorithm
4. Major-4 Computer Organization & Architecture
5. Major-5 Design and Analysis of Algorithms
6. Major-6 Introduction to Programming using Python LAB
7. Major-7
8. Major-8
9. Major-9
10. Major-10
11. Major-11
12. Major-12
13. Major-13
14. Major-14
15. Major-15
16. Major-16
17. Major-17
18. Major-18
19. Major-19

**MINOR= Minor (MINOR)- (Credit: 06 each)**

*To gain a broader understanding beyond the major discipline*

**Students need to choose any two Minor Discipline/Subjects, each comprising of 3 papers (Two Minors in 1<sup>st</sup> year, two in 2<sup>nd</sup> Year and two in 4<sup>th</sup> Year)**

**List of Papers :**

1. Minor -3 Introduction to Programming using Python
2. Minor -4 Data Structure & Algorithm
3. Minor -6 Computer Networks

**MULTIDISCIPLINARY COURSE= 3 MDC papers; MDC-1 (1<sup>st</sup> Semester), MDC-2 (3<sup>rd</sup> Semester), MDC-3 (5<sup>th</sup> Semester) (Credit: 03 each)**

Students have to choose any one disciplines as MDC, which should not be similar to their major or minor or even any subject which they had in their Higher Secondary. For each Discipline there will be one MDC.

**List of Papers :**

1. MDC -1 Computer Fundamentals and its Applications
2. MDC -2 Office Management Tools
3. MDC -3 Computer Networks

**COMPUTER SCIENCE**  
**MAJOR COURSE**

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 1<sup>ST</sup> SEMESTER

**Title of the Course** : Computer Fundamental & Digital Logic  
**Course Code** :  
**Nature of the Course** : MAJOR - 1  
**Course Credit** : 06credit (Theory-04, Practical-02)

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Introduction to Computers &amp; Problem solving</b> Generation of Computers; Computer system : Basic Block Diagram, Super Mainframe, Mini & Personal Computer, Nomenclature, Software : Systems and Application; Hardware & Software; Algorithms : Definition, essential features; Complexity : notation, time & space; Computability & correctness concepts; Structured programming concepts; Process of problem solving, Flowcharts and Pseudo codes	04	02		06
II	<b>Number System &amp; Arithmetic</b> Number System : Positional, binary, octal, decimal, hexadecimal and their representations, Methods of conversion from one base to another, sign magnitude, 1's complement; 2's complement; Binary Arithmetic; Fixed & floating point numbers: representation, biased exponent, range & precision, errors, overflow, underflow, BCD arithmetic	04	02		06
III	<b>Boolean Algebra</b> Concepts of propositional logic; Boolean algebra: definitions, postulates, properties, simplification of logical expressions using properties and maps (up to 4 variables), Min-term, Max-term expressions; Logic gates: AND OR, NOT, XOR, Combinational circuits, Simple logic design using logic gates. Simplification by Boolean theorems, don't care condition, Venn diagram. SSI, MSI, LSI and VLSI circuits	04	04		08
IV	<b>Logic Families</b> Introduction to digital logic family such as RTL, DTL, TTL, ECL, CMOS, IIR, HTL etc., their comparative study, Basic circuit, performance characteristics.	05		10	15
V	<b>Combinational Logic</b> Half adder, Full adder, parallel adder, half subtractor, full subtractor, 4-bit binary adder cum subtractor, Multiplexer, Demultiplexer, Decoder, BCD to seven segment Decoder, Encoders.	05		10	15
V1	<b>Sequential Circuit:</b> Set-reset latches, D-flip-flop, R-S flip-flop, J-K flip-flop, Master slave flip-flop, edge triggered flip-flop, T flip-flop, Synchronous/Asynchronous counter, Up/down synchronous counter, Ripple Counter, Applications of counter, Serial in/Serial out shift register, Parallel in/Serial out shift register, Serial in/parallel out shift register, parallel in/ parallel out shift register, Bi-directional register, Applications of register.	05		05	10
	<b>Total</b>	27	08	25	60

## Suggested Readings

1. "Digital Logic and Computer Design", M. Morris Mano, Pearson Publication
2. "An Introduction to Digital Computer Design", Rajaraman V. & Radhakrishnan, PHI.
3. "Digital Principles & Applications", Malvino & Leach, TMH
4. "Digital Circuits and Design", S. Salivahanan, S. Arivazhagan, Oxford University Press
5. Givone: digital Principles & design ,TMH
6. Malvino: Digital Principles & application TMH
7. Jain :Modern Digital Electronics 2/e TMH
8. Digital Integrated Electronics- H.Taub & D.Shilling, Mc Graw Hill
9. Digital Technology- Virendra Kumar, New Age

## Computer Fundamental & Digital Logic Lab:

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

### List of Experiments:

1. General study of Basic & Universal gates
  - a) AND b) OR c) NOT d) NOR e) NAND f) XOR g) XNOR
2. Simple Boolean Expression using Basic gates and Universal gates:  
 $A \cdot (B+A) + B \cdot A$   
 $XZ + X' Y Z$   
 $A + B [ AC + ( B + C' ) D ]$
3. Design Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor Circuit.
4. Parallel Adder (2-bit, 3-bit) Circuit.
5. Implement logic functions in SOP form using Multiplexer.
6. Implement De-multiplexer.
7. Implement 7- Segment Display with Decoder.
8. Implement Parity Generator (Odd & Even)
9. Implement Magnitude Comparator (1-bit, 2-bit, 3-bit)
10. Circuit design and implementation of Decoder (2x4)
11. Circuit design and implementation of Encoder (4x2)
12. Circuit design and implementation of an expression using decoders.

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 2<sup>ND</sup> SEMESTER

**Title of the Course** : Introduction to Programming using C  
**Course Code** :  
**Nature of the Course** : MAJOR - 2  
**Course Credit** : 06credit (Theory-04, Practical-02)

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Introduction to C</b> Overview of Procedural Programming, using main function, structure of a C program, Compiling and Executing Simple Programs in C, use of #include, #define	02		02	06
II	<b>Data Types, Variables, Constants, Operators and Basic I/O</b> Declaring, Defining and Initializing Variables, Scope and extent of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical, Relational, Increment/Decrement, Conditional, Bitwise, and special operators), Using Comments in programs, Formatted and Console I/O, storage classes; auto, extern, register	04		02	06
III	<b>Expressions, Conditional Statements, and Iterative Statements</b> Understanding Operator Precedence and associativity in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)	04		04	08
IV	<b>Understanding Functions</b> Utility of functions, Types of Functions, Functions returning value, Void functions, Inline Functions, Return type of functions, Parameters of functions; (formal and actual), Declaration and Definition of Functions, Command Line Arguments, Parameters in Functions, Functions with variable number of Arguments, Call by Value, Call by Reference,	05		05	10
V	<b>Implementation of Arrays and Strings</b> Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, accessing individual elements in an Array, manipulating array elements using loops), Types of arrays (integer, float and character arrays / Strings), Two-dimensional Arrays (Declaring, Defining and Initializing Two-Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays	05		10	15
V1	<b>User-defined Data Types (Structures and Unions)</b> Understanding utility of structures and unions, Declaring, initializing, and using simple structures and unions, manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members. <b>File I/O</b> Opening and closing a file, Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files,	07		10	15
	<b>Total</b>	27		33	60

## Suggested Readings

1. "The C Programming Language ANSI C Version", Kernighan & Ritchie, Prentice Hall Software Series
2. "ANSI C - Made Easy", Herbert Schildt, Osborne McGraw-Hill
3. "Learning to Program in C", N. Kantaris, Babani
4. "C - The Complete Reference", Herbert Schildt, Osborne McGraw-Hill
5. "Programming in C", Reema Thareja, Oxford University Press
6. "A First Course in Programming With C", T. Jeyapoovan, Vikas Publishing House
7. "Let Us C", Yashavant P. Kanetkar, BPB Publications
8. Tennence W.Pratt, "Programming languages design and implementation", Prentice Hall of India.
9. Allen B. Tucker, "Programming Languages", Tata McGraw Hill.
10. Gottfried BS – Programming with C, TMH pub.
11. Balagurusamy: ANSI C TMH

## Introduction to Programming using C Lab

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

### List of Experiments:

1. WAP to perform input/output of all basic data types.
2. WAP to enter two numbers and find their sum.
3. WAP to reverse a number.
4. WAP to Swap Two Numbers (using and without using a third variable).
5. WAP to check whether a number is even or odd
6. WAP to compute the factors of a given number.
7. WAP to enter marks of five subjects and calculate total, average and percentage.
8. WAP to print the sum and product of digits of an integer.
9. WAP to check whether a character is vowel or consonant
10. WAP to find the largest among three numbers
11. WAP to compute the sum of the first 'n' terms of the following series  
 $S = 1 - 2 + 3 - 4 + 5 \dots n$   
 $S = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots n$

13. WAP to print a triangle of stars as follows (take number of lines from user):

* ** *** **** *****	* ** *** **** *****	***** **** *** ** *	***** **** *** ** *	* ** *** **** *****	***** **** *** ** *
1 1 2 1 2 3 1 2 3 4 1 2 3 4 5	5 4 5 3 4 5 2 3 4 5 1 2 3 4 5	1 2 2 3 3 3 4 4 4 4 5 5 5 5 5	5 4 4 3 3 3 2 2 2 2 1 1 1 1 1	1 2 3 4 5 6 7 8 9 10 11 12 13 14	1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1 1 2 3 4 5 4 3 2 1
A A B A B C A B C D A B C D E	E D E C D E B C D E A B C D E	P Q R S T Q R S T R S T S T T	P P P P P Q Q Q Q R R R S S T	P P P P P Q Q Q Q R R R S S T	A A B A B C A B C D A B C D E

14. WAP to find the factors of a number.

15. WAP to display the Fibonacci series.

16. WAP to find the factorial of a number.

17. WAP to check if a number is prime or not.

18. WAP to check if a number is Armstrong or not.

19. WAP to check if a number is Perfect or not.

20. WAP to print all the prime numbers within a given range.

21. WAP to print all the Armstrong numbers within a given range.

22. WAP to create and display an array.

23. WAP to perform following actions on an array entered by the user: a) Print the even-valued elements

b) Print the odd-valued elements

c) Calculate and print the sum and average of the elements of array

d) Print the maximum and minimum element of array

e) Remove the duplicates from the array

f) Print the array in reverse order

24. WAP for addition of two matrices.

25. WAP to find the sum of the diagonals of a matrix.

26. WAP to check if a matrix is symmetric or not.

27. WAP for matrix multiplication.

28. WAP which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.

29. WAP to find the length of a string.

30. WAP to concatenate two strings entered by the user.

31. WAP to find if a character is present in a string or not.

32. WAP to reverse a string.



33. WAP to check if a string is palindrome or not.
34. WAP to convert all lowercase characters to uppercase
35. WAP to convert all uppercase characters to lowercase
36. WAP to calculate number of vowels in a string.
37. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
38. Write a program to retrieve the student information from file created in previous question and print it in following format:

Roll No.	Name	Marks
----------	------	-------

39. WAP to copy the contents of one text file to another file, after removing all whitespaces.
40. WAP to Write a Sentence to a File.
41. WAP to Read a Line From a File and Display it.

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 3<sup>RD</sup> SEMESTER

**Title of the Course** : Data Structure & Algorithm  
**Course Code** :  
**Nature of the Course** : MAJOR - 3  
**Course Credit** : 06credit (Theory-04, Practical-02)

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Arrays</b> Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation)	02		02	04
II	<b>Linked Lists</b> Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack in Lists; Self Organizing Lists; Skip Lists	04		04	08
III	<b>Stacks</b> Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack	02		02	04
IV	<b>Queues</b> Array and Linked representation of Queue, De-queue, Priority Queues	02		02	04
V	<b>Recursion</b> Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)	02		02	04
VI	<b>Trees</b> Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).	05		05	10
VII	<b>Graph Theory</b> Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees Kruskal's Algorithm; Prim's Algorithm; DFS; BFS. Cut Set: Fundamental Cut Set and Cut Vertices. Planar and Dual Graphs; Matrix Representation of Graphs (Adjacency and Incidence Matrices); Network; Flow Augmenting Path; Ford-Fulkerson Algorithm for Maximum Flow; Floyd Algorithm;	05		05	10

VIII	<b>Searching and Sorting</b> Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques	04		04	08
IX	<b>Hashing</b> Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collision by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect Hashing Function	04		04	08
	<b>Total</b>	30		30	60

## Suggested Readings

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning,2012.
2. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++:", Second edition, PHI, 2009.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
5. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010.
6. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd edition, 2011
7. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.
8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley
11. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
12. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.

## Data Structure & Algorithm Lab

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

### List of Experiments

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration
12. (ii) WAP to display fibonacci series (i)using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
14. WAP to create a Binary Search Tree and include following operations in tree:
15. Insertion (Recursive and Iterative Implementation)
16. Deletion by copying
17. Deletion by Merging
18. Search a no. in BST
19. Display its preorder, postorder and inorder traversals Recursively
20. Display its preorder, postorder and inorder traversals Iteratively
21. Display its level-by-level traversals
22. Count the non-leaf nodes and leaf nodes
23. Display height of tree
24. Create a mirror image of tree
25. Check whether two BSTs are equal or not
26. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
27. WAP to reverse the order of the elements in the stack using additional stack.
28. WAP to reverse the order of the elements in the stack using additional Queue.
29. WAP to implement Diagonal Matrix using one-dimensional array.
30. WAP to implement Lower Triangular Matrix using one-dimensional array.
31. WAP to implement Upper Triangular Matrix using one-dimensional array.
32. WAP to implement Symmetric Matrix using one-dimensional array.

33. WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, inorder traversal.
34. WAP to implement various operations on AVL Tree.

**Title of the Course** : **Computer Organization & Architecture**  
**Course Code** :  
**Nature of the Course** : **MAJOR - 4**  
**Course Credit** : **06credit (Theory-06)**

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Introduction</b> Review of Pipelining, Examples of some pipeline in modern processors, pipeline hazards, data hazards, control hazards. Techniques to handle hazards, performance improvement with pipelines and effect of hazards on the performance. Vector processors- Use and effectiveness, memory to memory vector architectures, vector register architecture, vector length and stride issues, compiler effectiveness in vector processors. SISD, MISD, MIMD, Single instruction multiple data stream (SIMD) architectures. Array processors, comparison with vector processors, example of array processors such as MMX Technology.	06	02		08
II	<b>Data Representation and Basic Computer Arithmetic</b> Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers	06	02		08
III	<b>Basic Computer Organization and Design</b> Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer	08	04		12
IV	<b>Central Processing Unit</b> Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.	08	04		12
V	<b>Memory Organization</b> Cache memory, Associative memory, mapping	06	04		10
V1	<b>Input-Output Organization</b> Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.	06	04		10
	<b>Total</b>	40	20		60

## Suggested Readings

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004

3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India, 2009
4. Digital Design, M.M. Mano, Pearson Education Asia

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 4<sup>TH</sup> SEMESTER

**Title of the Course** : Design and Analysis of Algorithms  
**Course Code** :  
**Nature of the Course** : MAJOR - 5  
**Course Credit** : 06credit (Theory-06)

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Introduction</b> Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm	06	02		08
II	<b>Algorithm Design Techniques</b> Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.	06	02		08
III	<b>Sorting and Searching Techniques</b> Elementary sorting techniques-Bubble Sort, InsertionSort, Merge Sort, Advanced Sorting techniques - Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques, Medians & Order Statistics, complexity analysis;	06	02		08
IV	<b>Lower Bounding Techniques</b> Decision Trees	06	02		08
V	<b>Balanced Trees</b> Red-Black Trees	06	02		08
V1	<b>Advanced Analysis Technique</b> Amortized analysis	06	04		10
VII	<b>Graphs</b> Graph Algorithms-Breadth First Search, Depth First Search and its Applications, MinimumSpanning Trees	06	04		10
	<b>Total</b>	42	18		60

## Suggested Readings

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009
2. Sarabasse& A.V. Gelder Computer Algorithm - Introduction to Design and Analysis, Publisher - Pearson 3rd Edition 1999



**Title of the Course** : Introduction to Programming using Python  
**Course Code** :  
**Nature of the Course** : MAJOR - 6  
**Course Credit** : 06credit (Practical-06)

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Introduction</b> History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator	02		03	05
II	<b>Conditional Statements</b> If, If- else, Nested if-else, Looping, For, While, Nested loops <b>Control Statements</b> Break, Continue, Pass	02		03	05
III	<b>String Manipulation</b> Accessing Strings, Basic Operations, String slices, Function and Methods	02		03	05
IV	<b>Lists</b> Introduction, Accessing list, Operations, Working with lists, Function and Methods	02		03	05
V	<b>Tuple</b> Introduction, Accessing tuples, Operations, Working, Functions and Methods	02		04	06
VI	<b>Dictionaries</b> Introduction, Accessing values in dictionaries, Working with dictionaries, Properties	02		04	06
VII	<b>Functions</b> Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables	02		04	06
VIII	<b>Modules</b> Importing module, Math module, Random module, Packages, Composition, Input-Output Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions	02		04	06
IX	<b>Exception Handling</b> Exception, Exception Handling, Except clause, Try? finally clause, User Defined Exceptions	02		06	08
X	<b>Introduction to NumPy, Pandas, Matplotlib.</b> Exploratory Data Analysis (EDA), Data Science life cycle, Descriptive Statistics, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA. Data Visualization: Scatter plot, bar chart, histogram, boxplot, heat maps, etc.	02		06	08
	<b>Total</b>	20		40	60

## Suggested Readings

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
2. R. Nageswara Rao, "Core Python Programming", Dreamtech Press.
3. Zed A. Shaw, "Learn Python 3 the Hard Way", Addison-Wesley.

4. Brett Slatkin, “Effective Python”, Addison-Wesley.
5. Taneja Sheetal, Kumar Naveen, “Python Programming A Modular Approach”, Pearson

**COMPUTER SCIENCE**

**MINOR COURSE**

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 3<sup>RD</sup> SEMESTER

**Title of the Course** : Introduction to Programming using Python  
**Course Code** :  
**Nature of the Course** : MINOR - 3  
**Course Credit** : 06credit (Theory-04, Practical-02)

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Introduction</b> History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator	02		03	05
II	<b>Conditional Statements</b> If, If- else, Nested if-else, Looping, For, While, Nested loops	02		03	05
III	<b>Control Statements</b> Break, Continue, Pass	02		03	05
IV	<b>String Manipulation</b> Accessing Strings, Basic Operations, String slices, Function and Methods	02		03	05
V	<b>Lists</b> Introduction, Accessing list, Operations, Working with lists, Function and Methods	02		04	06
VI	<b>Tuple</b> Introduction, Accessing tuples, Operations, Working, Functions and Methods	02		04	06
VII	<b>Dictionaries</b> Introduction, Accessing values in dictionaries, Working with dictionaries, Properties	02		04	06
VIII	<b>Functions</b> Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables	02		06	08
IX	<b>Modules</b> Importing module, Math module, Random module, Packages, Composition, Input-Output Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions	02		06	08
	<b>Total</b>	18		42	60

## Suggested Readings

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
2. R. Nageswara Rao, "Core Python Programming", Dreamtech Press.
3. Zed A. Shaw, "Learn Python 3 the Hard Way", Addison-Wesley.
4. Brett Slatkin, "Effective Python", Addison-Wesley.
5. Taneja Sheetal, Kumar Naveen, "Python Programming A Modular Approach", Pearson

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 4<sup>TH</sup> SEMESTER

**Title of the Course** : **Data Structure & Algorithm**  
**Course Code** :  
**Nature of the Course** : **MINOR - 4**  
**Course Credit** : **06credit (Theory-04, Practical-02)**

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Arrays</b> Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation)	02		02	04
II	<b>Linked Lists</b> Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack in Lists; Self Organizing Lists; Skip Lists	04		06	10
III	<b>Stacks &amp; Queues</b> Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack Array and Linked representation of Queue, De-queue, Priority Queues	04		05	09
IV	<b>Recursion</b> Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)	02		03	05
V	<b>Trees</b> Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).	07		05	12
V1	<b>Graph</b> Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees Kruskal's Algorithm ; Prim's Algorithm ; DFS ; BFS. Ford-Fulkerson Algorithm for Maximum Flow ; Floyd Algorithm ;	07		05	12

VII	<b>Searching and Sorting</b> Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques	04		04	08
	<b>Total</b>	30		30	60

## Suggested Readings

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
2. Sartaj Sahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidyah Langsam, "Data Structures Using C and C++", Second edition, PHI, 2009.
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8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub, 2003
9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley
11. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
12. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.

## Data Structure & Algorithm Lab

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

### List of Experiments

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration
12. (ii) WAP to display fibonacci series (i)using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
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16. Deletion by copying
17. Deletion by Merging
18. Search a no. in BST
19. Display its preorder, postorder and inorder traversals Recursively
20. Display its preorder, postorder and inorder traversals Iteratively
21. Display its level-by-level traversals
22. Count the non-leaf nodes and leaf nodes
23. Display height of tree
24. Create a mirror image of tree
25. Check whether two BSTs are equal or not
26. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
27. WAP to reverse the order of the elements in the stack using additional stack.
28. WAP to reverse the order of the elements in the stack using additional Queue.
29. WAP to implement Diagonal Matrix using one-dimensional array.
30. WAP to implement Lower Triangular Matrix using one-dimensional array.
31. WAP to implement Upper Triangular Matrix using one-dimensional array.
32. WAP to implement Symmetric Matrix using one-dimensional array.

33. WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, inorder traversal.
34. WAP to implement various operations on AVL Tree.



# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 8<sup>TH</sup> SEMESTER

**Title of the Course** : Computer Networks  
**Course Code** :  
**Nature of the Course** : MINOR - 6  
**Course Credit** : 06credit (Theory-04, Practical-02)

UNITS	COURSE CONTENTS	L	T	P	Total Hours
I	<b>Introduction to Computer Networks</b> Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite	04	02		06
II	<b>Data Communication Fundamentals and Techniques</b> Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques-FDM, TDM; transmission media.	04	02		06
III	<b>Networks Switching Techniques and Access mechanisms</b> Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.	04	02		06
IV	<b>Data Link Layer Functions and Protocol</b> Error detection and error correction techniques; data-link control-framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.	06	02		08
V	<b>Multiple Access Protocol and Networks</b> CSMA/CD protocols; Ethernet LANS; connecting LAN and backbone networks- repeaters, hubs, switches, bridges, router and gateways;	06	02		08
VI	<b>Networks Layer Functions and Protocols</b> Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.	06	04		10
VII	<b>Transport Layer Functions and Protocols</b> Transport services- error and flow control, Connection establishment and release- three way handshake;	06	04		10
VIII	<b>Overview of Application layer protocol</b> Overview of DNS protocol; overview of WWW & HTTP protocol.	04	02		06
	<b>Total</b>	40	20		60

## Suggested Readings

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM Publishing Company Ltd 2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI Pvt. Ltd 2002

**COMPUTER SCIENCE**  
**MULTIDISCIPLINARY COURSE**

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 1<sup>ST</sup> SEMESTER

**Title of the Course** : **Computer Fundamentals and its Applications**  
**Course Code** :  
**Nature of the Course** : **MDC - 1**  
**Course Credit** : **03 credit (Theory - 03)**

UNITS	COURSE CONTENT	L	T	P	TOTAL HOURS
I	<b>Computer Basics:</b> What is Computer, Basic Applications of Computer; Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Concepts of Hardware and Software; Concept of Computing, Data and Information; Applications of Information Electronics & Communication Technology (IECT); Connecting keyboard, mouse, monitor and printer to CPU and checking power supply.	7	4		11
II	<b>Operating System:</b> What is an Operating System; Basics of Popular Operating Systems; The User Interface, Using Mouse; Using right Button of the Mouse and Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Menu-selection, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts, Basics of O.S Setup; Common utilities.	4	8		12
III	<b>Introduction to DOS:</b> Files, Directories, Drives, using extensions and wildcards, Basic DOS commands: (CLS, DIR, COPY, CMD, CD, MKDIR, DEL, TIME, REN), Booting, warm boot, cold boot, concept of BIOS Algorithm, Algorithm for simple problems, Flowchart: Components of a flowchart, Drawing flowcharts for simple problems, Structure of a program, types of languages: unstructured, structured, procedure oriented, object oriented	6	6		12
IV	<b>Networking Basics:</b> Introduction; Types of network: LAN, MAN, WAN; Concept of Addressing scheme; IP; IP setup in a workstation; DHCP; Wifi	4	6		10
		21	24		45

*Where, L: Lecture, T: Tutorial, P: Practical*

## Suggested Readings

1. "Computer Fundamentals: Architecture and Organization", B. Ram, New Age International Publisher
2. "Computer Fundamentals", P. K. Sinha, BPB Publications
3. "Fundamentals of Computers", V. Rajaraman & Neeharika Adabala, Prentice Hall India Learning Private Limited
4. "Data Communication & Networking", BA Forouzan, McGraw Hill

# BACHELOR OF SCIENCE PROGRAMME (FYUGP) DETAILED SYLLABUS OF 3RD SEMESTER

**Title of the Course** : **Office Management Tools**  
**Course Code** :  
**Nature of the Course** : **MDC - 2**  
**Course Credit** : **03 credit (Theory - 03)**

UNIT S	COURSE CONTENTS	L	T	P	TOTAL HOURS
<b>I</b>	<b>Understanding Word Processing:</b> Word Processing Basics; Opening and Closing of documents; Textcreation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.	<b>05</b>		<b>10</b>	<b>15</b>
<b>II</b>	<b>Using Spread Sheet:</b> Basics of Spreadsheet; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet.	<b>05</b>		<b>10</b>	<b>15</b>
<b>III</b>	<b>Making small presentation:</b> Basics of presentation software; Creating Presentation; Preparation and Presentation of Slides; Slide Show; Taking printouts of presentation / handouts.	<b>05</b>		<b>10</b>	<b>15</b>
	<b>Total</b>	<b>15</b>		<b>30</b>	<b>45</b>

Where, L =Lecture, T =Tutorial, P =Practical

## Suggested Software packages: MS-Office Software

## Reference Books:-

1. Microsoft Office 2016 A Beginner's Guide to Microsoft Office, Author: Matthew Conner
2. Microsoft Office 2019 Step by Step, Author: Joan Lambert, Curtis Frye
3. Office 365 All-in-One For Dummies, Author: Peter Weverka, Timothy L. Warner

## Recommended Experiment:

1. Create a **telephone directory**.
  - The heading should be 16-point Arial Font in bold
  - The rest of the document should use 10-point font size
  - Other headings should use 10-point Courier New Font.
  - The footer should show the page number as well as the date last updated.
2. Design a time-table form for your college.
  - The first line should mention the name of the college in 16-point Arial Font and should be bold.
  - The second line should give the course name/teacher's name and the department in 14- point Arial.
  - Leave a gap of 12-points.
  - The rest of the document should use 10-point Times New Roman font.
  - The footer should contain your specifications as the designer and date of creation.

3. Create the following one page documents.
  - (a) Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.
  - (b) Design a certificate in landscape orientation with a border around the document.
4. Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
5. Convert following text to a table, using comma as delimiter Type the following as shown (do not bold).  
**Color, Style, Item Blue,**  
**A980, Van Red, X023, Car**  
**Green, YL724, Truck**  
**Name, Age, Sex Bob, 23,**  
**M Linda, 46,**  
**F Tom, 29, M**
6. Prepare a grocery list having four columns (Serial number, the name of the product, quantity and price) for the month of April, 06.
  - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
  - The headings of the columns should be in 12-point and bold.
  - The rest of the document should be in 10-point Times New Roman.
  - Leave a gap of 12-points after the title.
7. XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.
  - (a) The title of the book should appear in bold using 20-point Arial font.
  - (b) The name of the author and his qualifications should be in the center of the page in 16- point Arial font.
  - (c) At the bottom of the document should be the name of the publisher and address in 16- point Times New Roman.
  - (d) The details of the offices of the publisher (only location) should appear in the footer.
8. Create the following one page documents.
  - a) Design a Garage Sale sign.
  - b) Make a sign outlining your rules for your bedroom at home, using a numbered list.
9. Enter the following data into a table given on the next page.

<b>Salespers on</b>	<b>Dolls</b>	<b>Trucks</b>	<b>Puzzles</b>
Amit	1327	1423	1193
Shivi	1421	3863	2934
Om	5214	3247	5467
Ananya	2190	1278	1928
Anupama	1201	2528	1203
Maharshi	4098	3079	2067

Add a column Region (values: S, N, N, S, S, S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

**Practical List for Spreadsheet**

Q1. Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using:-

- i) Copy/Paste
- ii) Embedding
- iii) Linking

Q2. The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create 4<sup>th</sup> worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4<sup>th</sup> worksheet should contain college name as the first line. Make it bold, italic and center it.

Q3. Using a simple pendulum, plot 1-T and 1-T<sup>2</sup> graph.

I	t1	t2	t3	Mean(t)	T=t/20	T <sub>2</sub>
70						
80						
90						
100						

Q4. Consider the following employee worksheet:-

Full Name (First Last)	Grade 1/2/3	Basic Salary	HRA	PF	Gross	Net	(VA) Vehicle Allowance

HRA is calculated as follows:

Grade	HRA %(of Basic)
1	40%
2	35%
3	30%

Gross = Basic + HRA + VA Net = Gross

-PF PF is 8% for all Grades

VA is 15000, 10000 and 7000 for Grades 1, 2 and 3.

- i) Find max, min and average salary of employees in respective Grade
- ii) Count no. of people where VA>HRA
- iii) Find out most frequently occurring grade.
- iv) Extract records where employee name starts with “A” has HRA>10000
- v) Print Grade wise report of all employees with subtotals of net salary and also grand totals. Use subtotal command.
- vi) Extract records where Grade is 1 or 2 and salary is between 10000 and 20000 both inclusive.

Q5. In a meeting of a marketing department of an organization it has been decided that price of selling an item is fixed at Rs40. It was resolved to increase the sell of more of more items and getting the profit of Rs40,000/. Use Goal Seek of find out how many items you will have to sell to meet your profit figure.

Q6. To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P - V and P-I/V. Sample

observations are:-

Pressure(P)	Volume (V)	I/V	PV	P/V
75	20			
78.9	19			
83.3	18			
88.2	17			

Q7. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).

Q8. Create the following worksheet(s) containing an year wise sale figure of five salesmen in Rs.

Salesman	2002	2003	2004	2005
MOHAN	10000	12000	20000	50000
MITRA	15000	18000	50000	60000
SHIKHA	20000	22000	70000	70000
ROHIT	30000	30000	100000	80000
MANGLA	40000	45000	125000	90000

Apply the following Mathematical & Statistical functions:

- i) Calculate the commission for each salesman under the condition :-
  - a) If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.
  - b) Otherwise, 4% of total sale.
- ii) Calculate the maximum sale made by each salesman.
- iii) Calculate the maximum sale made in each year.
- iv) Calculate the minimum sale made by each salesman.
- v) Calculate the minimum sale made in each year.
- vi) Count the no. of sales persons.
- vii) Calculate the cube of sales made by Mohan in the year 2002.
- viii) Find the difference in sales by salesman Mitra between the year 2002 and 2003. Find the absolute value of difference.
- ix) Also calculate the Mode, Stddev, Variance, Median for the sale made by each salesman.
- ix) Calculate the year wise Correlation coefficient between the sales man Mohan and Mitra year wise

Q9. The following table gives an year wise sale figure of five salesmen in Rs.

Salesman	2000	2001	2002	2003
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

- i) Calculate total sale year wise.
- ii) Calculate the net sales made by each salesman
- iii) Calculate the commission for each salesman under the condition :-

- c) If total sales is greater than Rs. 4, 00,000/-, then commission is 5% of total sale made by the salesman.
- d) Otherwise, 2% of total sale.
- iv) Calculate the maximum sale made by each salesman.
- v) Calculate the maximum sale made in each year.
- vi) Draw a bar graph representing the sale made by each salesman.

S.No.	Name	PH	CH	BY	MT	CS	Total Marks	%	Grade

- vii) Draw a pie graph representing the sale made by salesmen in year 2001.

10. Consider the following worksheet for APS 1<sup>st</sup> year students:-

1Grade is calculated as follows:-

If %  $\geq 90$  If % Grade A  
 $\geq 80$  &  $< 90$  If % Grade B  
 $\geq 70$  &  $< 80$  If % Grade C  
 $\geq 60$  &  $< 70$  Grade D  
 Otherwise

students will be declared fail.

- i) Calculate Grade using if function
- ii) Sort the data according to total marks
- iii) Apply filter to display the marks of the students having more than 65% marks.
- iv) Draw a pie chart showing % marks scored in each subject by the topper of the class.
- v) Draw the doughnut chart of the data as in (iv)
- vi) Enter the S.No. of a student and find out the Grade of the student using VLOOKUP.
- vii) Extract all records where name
  - a) Begins with "A"
  - b) Contains "A"
  - c) Ends with "A"

**Practical List for presentation:**

1. Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.
2. Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.
3. Create five Power Point slides detailing the process of internal assessment. It should be a self running demo.