SHIVAJI UNIVERSITY, KOLHAPUR.

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CHOICE BASED CREDIT SYSTEM

Syllabus For

B.Sc. Part - II

Computer Science (Entire)

SEMESTER III AND IV

(Syllabus to be implemented from June, 2019 onwards.)

B.Sc. Computer Science Entire Part-II

Year of Implementation: Revised Syllabus will be implemented from June 2019
Duration : Part- II shall be of one academic year consisting of two semesters.
Pattern : Semester Pattern.

STRUCTURE OF THE SYLLABUS

Code	Course	Course Title
SEMESTER – III		
DSC-301	Computer Science Paper - V	Relational Database Management System
DSC-302	Computer Science Paper - VI	Object Oriented Programming using C++
GEC-303	Electronics Paper - V	Computer Organization
GEC-304	Electronics Paper - VI	Computer Instrumentation
GEC-305	Mathematics Paper – V	Linear Algebra
GEC-306	Mathematics Paper – VI	Numerical methods
SEC-I	Skill Enhancement Course - I	Python Programming
AECC-C	Environmental Studies	(Environmental Studies) Theory Paper
SEMESTER – IV		
DSC-401	Computer Science Paper - VII	Data structure using C++
DSC-402	Computer Science Paper - VIII	Cyber security essentials
GEC-403	Electronics Paper - VII	Microcontroller Architecture and Programming
GEC-404	Electronics Paper - VIII	Communication Techniques
GEC-405	Mathematics Paper – VII	Computational Geometry
GEC-406	Mathematics Paper – VIII	Operation Research
SEC-II	Skill Enhancement Course - II	HTML (Web Technology)
AECC-D	Environmental Studies	Project
LAB-5	Lab Course Based on DSC-301, 401 & 302	
LAB-6	Lab Course based on GEC- 303,403 & 304, 404	
LAB-7	Lab Course based on GEC- 305,306 & 405, 406	
LAB-8	Lab Course based on SEC-I & SEC-II	

Choice Based Credit System (CBCS)
B.Sc. Computer Science Entire Part II
Syllabus to be implemented from June 2019 onwards.

Course: Computer Science

1. **TITLE: Computer Science**
2. **YEAR OF IMPLEMENTATION :** Revised Syllabus will be implemented from June 2019 onwards.
3. **DURATION :** B.Sc. in Computer Science Entire Part- II The duration of course shall be one year and Two semesters.
4. **PATTERN:** Pattern of examination will be semester.
5. **STRUCTURE OF COURSE:**

Computer Science(Semester III)

Code	Paper	Name of Paper	Marks
DSC-301	Paper -V	Relational Database Management System	50 (Theory)
DSC-302	Paper -VI	Object Oriented Programming using C++	50 (Theory)

Computer Science (**Semester IV)**

Code	Paper	Name of Paper	Marks
DSC-401	Paper- VII	Data structure using C++	50 (Theory)
DSC-402	Paper- VIII	Cyber security essentials	50 (Theory)

Practical Examination (Annual)

Code	Name of Paper	Marks
LAB-5	Practical Examination Based onDSC-301, 401 & 302	100
LAB -8	Practical Examination Based on SEC-I & SEC-II	100

EQUIVALENCE IN ACCORDANCE WITH TITLIES AND
CONTENTS OF PAPERS (FOR CBCS SYLLABUS)

Sr. No.	Title of Old Paper	Code	Paper No.	Title of New Paper
SEMESTER III				
1	Paper- V Object Oriented Programming (C++)	DSC-301	**V**	Relational Database Management System
2	Paper-VI System Analysis, Design and Introduction to Software Engineering	DSC-302	**VI**	Object Oriented Programming using C++
SEMESTER – IV				
3	Paper – VII: Data Structure through C++	DSC-401	**VII**	Data structure using C++
4	Paper –VIII: RDBMS with Oracle	DSC-402	**VIII**	Cyber security essentials
Practical ANNUAL PATTERN				
5	Computer Science	LAB-5	**---**	Lab Course Based on DSC-301, 401 & 302
6	Computer Science	LAB-8	**---**	Lab Course Based on SEC-I & SEC-II

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

Detail syllabus of semester III and IV

SEMESTER – III

Course Code: DSC-301: Computer Science Paper-V

Course Title: Relational Database Management System

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Outcomes:

1. Improving skill about data operation.
2. Ability to handle database.
3. Ability to design& develop proper database.
4. SQL/MY-SQL helps to get knowledge about data operations.

Unit	Content	Hours Allocated
1	**Introduction to RDBMS** • Data ,Database, DBMS, RDBMS, Concepts of Data Models object based, Record based (Network, Hierarchical,Relational),Physical • Concept of RDBMS Terminologies: relation, attribute, domain, tuple, entities, DBA and Responsibilities of DBA • Relational Model: Structure of Relational Database, Relational Algebra.	12
2	**Structured Query Language (SQL)** • SQL: Data types-fixed length, variable length, ex. • Data Constraints-Primary key, Foreign key, Null, Check, Default • Clauses-(Select, where, group by, order by). • SQL Operators: Logical, Relational, Special-In, Between, Like • Sub Queries and Join-Sub queries and Nesting sub queries, Join: Equi join, Simple join , Outer join ,self join • Views, Indexes, Sequence	12
3	**Introduction to PL-SQL** • Comparison between SQL & PL-SQL • Structure of PL-SQL block. • Benefits of PL/SQL over SQL • Control structure: if statement, case statement, Loops-Simple looping, For, While. • Need of Iterative and looping statements in data handling	10
4	**Introduction to MySQL** • Difference between SQL and MySQL, Creating a Database and Tables, Inserting, Selecting, • Ordering, Limiting, Grouping, Analyzing and Manipulating Data, Changing, Deleting, • Searching, Database and Table Schema Statements, Data Manipulation Statements and Functions, Table Statements and Functions, Replication Statements and Functions. • Aggregate Clauses, Aggregate Functions, String Functions, Date and Time Functions, Mathematical Functions.	14

Reference book-

1. Data base system concept- KorthSilberschartz.
2. SQL-PL/SQL by Ivan Bayross BPB Publications.
3. Structure query language-By Osborne
4. Learning MySQL by O'reilly

Course Code: DSC-302: Computer Science Paper-VI
Course Title: Object Oriented Programming using C++
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course outcomes:
The student should -

- Understand basic concepts of object oriented programming.
- Able to use various control structures to improve programming logic.
- Design classes and objects.
- Able to use constructor and destructor.

  Utilize the OOP techniques like operator overloading, inheritance, and polymorphism.

Unit	Contents	Hours Allotted
I	Object Oriented Concepts- Difference between POP and OOP . Concepts of OOP- Data abstraction, Encapsulation, Inheritance, Polymorphism. Basics of C++- Terminology-Tokens, Keywords, Identifiers, constants. Basic data types. Structure of C++ program. Input and output streams.	12
II	Operators in C++ Dynamic Memory allocation (New and Delete), this pointer. Dynamic initialization of variable, reference variables. Control structures- Branching and looping statements. Features of OOP: Classes and objects- Definitions, class declaration. Member function- Access modifiers : private, public and protected, Defining member functions, static data members. Array of objects, passing object as parameter, inline function, reference arguments. Friend function and friend class.	12
III	Constructors- Definition, types- Default constructor, Copy constructor, Parameterised constructor. Destructors. Operator overloading- Definition Overloading unary and binary operators. Overloading operators using friend function. Rules for overloading operator.	12
IV	Inheritance- Defining base and derived class. Types of Inheritance –Single , multiple, multilevel, hierarchical, hybrid. Polymorphism- Definition. Types of polymorphism. Virtual function.	12

Reference Books:

1. Object oriented programming By E. Balagurusamy.
2. C++ Programming –By D. Ravichandran
3. Let Us C++ By YashawantKanetkar.
4. Object Oriented Programming in C++ - Dr. G. T. Thampi, Dr. S. S. Mantha
5. Mastering C++ -By Venugopal.

SEMESTER – IV
B. Sc. Part- II Computer Science Entire
Course Code: DSC-401: Computer Science Paper-VII
Course Title: Data structure using C++
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Course Outcome :

- At the end of this course, student should be able understand the most basic aspects of data structures including Stacks, Queue, Linked list and Tree.
- Should able to understand different sorting and searching algorithms.
- Should able to understand implementations of linked list, stack and queue.

Unit	Contents	Hours Allotted
I	**Concepts of Data structure, Array** 1.1 Concept of Data, Data Object, Types of Data- Atomic Data, Non-atomic Data 1.2 Concept of Data Structure 1.3 Abstract data type (ADT) **1.4** Array Definition, Array Operations, Applications of Array(Polynomial evaluation and addition of two polynomials), Multi-dimensional arrays.	**12**
II	**Algorithm Analysis** **2.1** Space complexity, time complexity 2.2 Asymptotic notation (Big O, Omega Ω, Theta Θ) 2.3 Searching algorithms- Linear search, binary search and their algorithms 2.4 Sorting algorithm-Bubble Sort, insertion sort, selection sort, quick sort and their algorithms.	**12**
III	**Stack and Queue** 3.1 Stack 3.1.1 Concept of Stack 3.1.2 Operations on Stack-push,pop,peek 3.1.3 Array implementation of Stack 3.4.4 Linked List implementation of Stack 3.5 Applications of Stack- Recursion, Infix, Prefix, Postfix, conversion from Infix to Prefix and Infix to Postfix 3.2 Queue 3.2.1 Concepts of queue 3.2.2 Operationson Queue-Insert,Delete,peek 3.2.3 Array implementation of queue 3.2.4 Linked List Implementation of Queue 3.2.5 Types of Queue-Linear, Circular and Priority 3.2.6 Applications of Queue	**12**
IV	**LinkedList and Tree** 4.1 LinkedList 4.1.1 Concept of LinkedList 4.1.2 Memory representation of LinkedList 4.1.3 Operations on LinkedList(Insertion, Deletion, Display and Search)	**12**

	4.1.4 Types of LinkedList: Singly, Doubly LinkedList& Circular LinkedList 4.2 Tree 4.2.1 Concept of Tree, Tree terminology (root, child, parent, sibling, descendent, ancestor, leaf/external node, branch node/internal node, degree, edge, path, level, depth, height of node, height of tree, forest) 4.2.2 Binary Tree- definition , types (Full/Proper / Plane, Complete, Perfect, Skewed, Balanced) 4.2.3 Binary search tree 4.2.4 Operations on BST – Create, Insert, Search, Delete, traversals (Preorder, Inorder, Postorder)	

Reference Books :

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

Course Code: DSC-402: Computer Science Paper-VIII
Course Title: Cyber Security Essentials
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Course Outcome :

Students who complete this course should be able to:

1. Understand importance of cyber security and security management.
2. Learn different security threats.
3. Understand cyber security laws and importance of security audit.
4. Learn concept of wireless network security.

Unit	Contents	Hours Allotted
I	**Introduction to Cyber Security** **Cyber Security:** Definition, Importance, Computer ethics, Cyber Security Policy, Data Security, Mobile Device Security, User Security, File Security, Password Security, Browser Security, Email Security, Phishing Encryption, Decryption, Digital Signature, Firewall, Configuring, Windows Firewall.	**12**
II	**Types of Security and Security Management** **Types of Security:** Background and Current Scenario, Types of Attacks, DoS attack, Goals for Security, E-commerce Security, dimensions of E-commerce security, Security protocols, Computer Forensics, Steganography, **Security Management-** Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Ethics and Best Practices.	**12**
III	**Security Threats and Access Controls** **Security Threats:** Definition, Types of Threats - Virus, Worms, Trojan Horse, Malware, Ransomware, Identity theft etc, Torrent and infected websites, Antivirus-Definition, Types, features, advantages, limitations. **Access Controls:** Overview of Authentication and Authorization, Overview of Intrusion Detection Systems, Intrusion Detection Systems and Intrusion Prevention Systems.	**12**
IV	**Wireless Network Security** **Wireless Network Security-** Components of wireless networks, Security issues in wireless, Wi-Fi Security, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall.	**12**

Reference Books:

1. Computer Network -AS Tannenbum
2. Cyber Security for Beginners: Everything you need to know about it (Cyber security, Cyber war, Hacking) - Harry Colvin.
3. How NOT To Use Your Smartphone - Rodney D Cambridge.
4. Online Safety: Scams, SPAM, Viruses and Clouds (Cyber Security Community Book -A.M. Perry.
5. Cyber Security Essentials- James Graham, Richard Howard, Ryon Olson (E-book)
6. Network Security Secrets and Solutions – Stuart McClure, Joe Scambray, George Kurtz.
7. Information Assurance Handbook: Effective Computer Security and Risk Management Strategies – Corey Schou, Steven Hernandez.
8. Applied Network Security Monitoring: Collection, Detection, and Analysis – Chris Sanders, Jason Smith.
9. E-Commerce- Indian Perspective- P.T. Joseph S.J.
10. E-Commerce and Security- KjellOrsborn (E-book)

LAB-5– (Computer Science) Lab Course Based on DSC-301, 401 &302

Lab Course –V

(Based on DSC- 301) Relational Database Management System

1. Create student master and student detailed table with appropriate field to apply following constraint on field.
   a. Primary Key
   b. Foreign Key
   c. Not null key
   d. default key
   e. Check constraint etc.

2. Create student table with appropriate field and do.

   a. Insert 10 appropriate records

   b. Update any record

   c. Delete record

   d. Alter table

   e. drop table

3. Use any tables and do select operations using Operators.

4. Use any tables and do select operations using different clauses,

   a. where

   b. group by

   c. order by etc

5.Use any tables and do select operations using different aggregate functions.

6.Use any tables and do sub queries and join operator.

7. Use any tables and do select operations using different string functions.

8. To show the table Index, View on existing table.

(Based on DSC- 401) Data Structure through C++

1. Write a C++ programs to implement recursive i) Linear search ii) Binary search
2. Write a C++ programs to implement i) Bubble sort ii) Selection sort iii) quick sort iv) insertion sort
3. Write a C++ programs to implement the following using an array.
    a) Stack ADT b) Queue ADT
4. Write a C++ programs to implement list ADT to perform following operations:
    a) Insert an element into a list.
    b) Delete an element from list
    c) Search for a key element in list
    d)count number of nodes in list
5. Write C++ programs to implement the following using a singly linked list.
    a) Stack ADT b) Queue ADT
6. Write a C++ program to perform the following operations:
    a) Insert an element into a binary search tree.
    b) Delete an element from a binary search tree.
    c) Search for a key element in a binary search tree.

7.Write C++ programs for implementing the following sorting methods: insertion sort, bubble sort , selection sort,quick sort

(Based on DSC- 302)OOP using C++

1. Programs based on branching and looping statements.
2. Programs based on constructor and destructor.
3. Programs based on inheritance concept
4. Programs based on function overloading concept
5. Programs based on operator overloading concept
6. Programs based on member functions.
7. Programs based on use of constructor and destructor
8. Programs based on friend function.
9. Programs based on inheritance.
10. Programs based on polymorphism

SEMESTER – III
B. Sc. Part- II Computer Science Entire (Semester III)

Course Code: SEC-I : Skill Enhancement Course - I
Course Title: Python Programming
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Course Outcome:

1. To understand why Python is a useful scripting language for developers.
2. To learn how to install Python, start the Python shell
3. To define the structure and components of a Python program.
4. To learn to perform basic calculations, print text on the screen and perform simple control flow operations using if statements and for loops
5. To learn how to use lists, tuples, and dictionaries in Python programs
6. To learn how to reuse code with functions

Unit	Contents	Hours Allotted
I	**Introduction to Python and Basic Concepts in python** **Introduction to python:** What is python? , Applications of Python, Why Python? Installation of python, First program in Python, Comments and Docstrings in Python.Variable and data types, Operators in python. **File Handling :** working with open, read, write, append modes of file **Conditional Statements:** Indentation in python, if, if-else, nested if-else statements	**12**
II	**Looping Statements, Control statements, String Manipulations** **Looping Statements:** for loop, while loop , Nested loops **Control Statements:** break, continue and pass **String Manipulations:** Accessing strings, Basic operations, String slices, Functions and methods	**12**
III	**Python collection** **Python collections** : list, Tuple, set and dictionary **List:** Introduction,Accessinglists,change item value in list, loop through list, methods **Tuple:** Introduction, Accessing tuples, change item value in tuple , loop through tuple and methods of tuple **Set:** introduction and methods of set **Dictionary:**Introduction,Accessing values in dictionaries, properties, Change value in dictionary,loop through dictionary and methods of dictionary.	**12**
IV	**Functions, Data visualization in python** **Functions:** Defining a function, Calling a function, Function arguments, Default parameter value, Anonymous function:Lambda function(why use lambda,syntax and examples of lambda). **Data visualization in python:** Pandas packages (NumPy and matplotlib libraries)	**12**

Reference Books:

1. Introducing python - Bill Lubanovic
2. Machine Learning (in Python and R) For Dummies - John Paul Mueller
3. Core Python Programming – Dr. R.Nageswara Rao.
4. Python Cookbook - David Beazley and Brian K. Jones
5. Python Cookbook – David Ascher,AlexMartelli

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

Course Code: SEC-II : Skill Enhancement Course - II
Course Title: HTML (Web Technology)
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory – 04 Lect. / Week Total Marks: 50

Course Outcomes :

Students who complete this course should be able to:

1. Understand basic concept of HTML.
2. Learn how to use HTML tags.
3. Understand relationship of HTML and CSS.

Unit	Contents	Hours Allotted
I	**Introduction to HTML.** **Introduction** - Fundamental Elements of HTML, Advantages and Disadvantages of HTML, Basic structure of HTML. **HTML Tags** – Basic HTML Tags, Text Formating Tags, List Tags.	**12**
II	**Advanced HTML.** Links and URLs in HTML, Tables in HTML, Frames tags with their attributes. Forms tag, Input Tag, Select Tag.	**12**
III	**Introduction to CSS.** Introduction, Features, Style Sheet Basics, Understanding the syntax of CSS, Types Style Sheets – Inline style, Embedded Styles, External or Linked Styles.	**12**
IV	**Formating Text using CSS.** Formating Text and Fonts – Font Families, Font Size Kerning, Leading and Indenting. FormatingColors and Backgrounds – The Color Attribute, The Background Attribute, Background Colors and Images.	**12**

Text Books :

1. Teach Yourself Web Technologies – Ivan Bayross – (BPB)
2. Web Technology – Ramesh Bangia – Reprint 2008

Reference Books:

1. HTML4 Unleashed – Rick Dranell
2. Dynamic Web Publishing Unleashed – Shelly Power.
3. HTML and Web Designing – Kris Jama and Konrad King, (McGrawHill)
   The E-Biz Primer How to design profitable websites and portals Alexis Leon and Mathews Leon.

LAB-8- Lab Course based on SEC-I & SEC-II

SEC-I Lab Assignments – (Python Programming)

1. Hello world program in python
2. Python Program to Check Whether a Given Year is a Leap Year
3. Python Program to Check Whether a Number is Positive or Negative
4. Python Program to Take in the Marks of 5 Subjects and Display the Grade
5. Print "1" if a is equal to b, print "2" if a is greater than b, otherwise print "3".Print "Hello" if a is equal to b, and c is equal to d.
6. Python Program to Read a Number n And Print the Series "1+2+…..+n= "
7. Python Program to Check if a Number is a Palindrome
8. Python Program to Count the Number of Digits in a Number
9. Python Program to Find the Sum of Digits in a Number
10. Python Program to Print Odd Numbers Within a Given Range
11. Python Program to Find the Factorial of a Number
12. Python Program to check the number is prime or not
13. Python program to print hello world message using function
14. Python Program to Make a Simple Calculator using function
15. Python program to demonstrate lambda function

SEC-II Lab Assignments – (HTML Web Technology)

1. To learn simple web page using text formatting tags.
2. To learn a simple web page using text list tags.
3. To learn a web page using table tags.
4. To learn a web page using frame tags and their attributes.
5. Design a web page to list a table of contents and navigate within the pages.
6. Design a time table and display it in tabular format.
7. Design a CSS to create menu.
8. Design a bio- data web page using CSS.
9. To design table & list using CSS

B.Sc. II Computer Science Entire

COMPUTER SCIENCE

Total **Work–Load**

Semester III

Paper No.	Title of the Paper	Total Marks	Lectures Per week
V	Relational Database Management System	50 (Theory)	4
VI	Object Oriented Programming using C++	50 (T**heory)**	4

Semester IV

Paper No.	Title of the Paper	Total Marks	Lectures Per week
VII	Data structure using C++	50 (Theory)	4
VIII	Cyber security essentials	50 (Theory)	4

Practical Exam (Annual)

LAB No.	Title of the Paper	Total marks	Lectures per week
LAB -5	Practical Based on DSC-301, 401 & 302	100	4
LAB -8	Practical Based on SEC-I & SEC-II	100	4

*Note : 8 Lectures per week per 20 students batch.

Work load:

(i) Total teaching periods for paper -V,VI are 8(eight) per week.

4(four) periods per paper per week, for semester III

(ii) Total teaching periods for paper - VII,VIII are 8(eight) per week.

4(four) periods per paper per week, for semester IV

(iii) Total teaching periods for practical course in computer science -III & IV, 8 hours per week per 20 students batch.

Scheme of examination

●The theory examination shall be conducted at the end of each semester.

●The theory paper shall carry 50 marks.

●There shall be no theory exam on SEC –I & SEC –II.

●The practical examination shall be conducted annually.

●The practical paper shall carry 200 marks. (100 marks for LAB -5 (external assessment) & 100 marks for LAB-8 (internal assessment))

Nature of theory question paper

●As per regular B.Sc. Programme.

Examination scheme for practical

● The practical paper shall carry 100 marks.

● There shall be five questions carrying 25marks each. Student has to attempt any three questions.

● 10 marks for journal and 15 marks for viva.

● The duration of practical examination will be four hours.

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Choice Based Credit System (CBCS)

B.Sc. Computer Science Entire Part II
Syllabus to be implemented from June 2019 onwards.

Course: Electronics

1. **TITLE:** Electronics
2. **YEAR OF IMPLEMENTATION :** Revised Syllabus will be implemented from June 2019 onwards.
3. **DURATION :** B.Sc. in Computer Science Entire Part- II The duration of course shall be one year and Two semesters.
4. **PATTERN:** Pattern of examination will be semester.
5. **STRUCTURE OF COURSE:**

Electronics (**Semester III)**

Code	Paper	Name of Paper	Marks
GEC-303	Paper -V	Computer Organization	50 (Theory)
GEC-304	Paper -VI	Computer Instrumentation	50 (Theory)

Electronics (**Semester IV)**

Code	Paper	Name of Paper	Marks
GEC-403	Paper- VII	Microcontroller Architecture &Programming	50 (Theory)
GEC-404	Paper- VIII	Communication Techniques	50 (Theory)

Practical Examination (Annual)

Code	Name of Paper	Marks
LAB-6	Practical Examination Based on Theory Papers V,VI.VII & VIII	100

EQUIVALENCE IN ACCORDANCE WITH TITLIES AND CONTENTS OF PAPERS (FOR CBCS SYLLABUS)

Sr. No.	Title of Old Paper	**Code**	**Paper No.**	**Title of New Paper**
SEMESTER III				
1	Computer Organization	GEC-303	V	Computer Organization
2	Computer Instrumentation-I	GEC-304	VI	Computer Instrumentation
SEMESTER – IV				
3	Microcontrollers	GEC-403	VII	Microcontroller Architecture & Programming
4	Computer Instrumentation-II	GEC-404	VII	Communication Techniques
ANNUAL PATTERN				
5	Electronics Practical III & IV	LAB-6	--	Practical Examination Based on Theory Papers V,VI.VII & VIII

B.Sc. Computer Science Entire Part II (CBCS)
Electronics
Detail Syllabus of Semester III and IV
Semester- III
Course Code: GEC-303: Electronics Paper-V
Course Title: Computer Organization
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	**DIGITAL SYSTEM DESIGN** Introduction to digital circuit design, Circuit design using logic gates: Binary to Gray converter, Gray to Binary, BCD to Excess 3& Excess 3 to BCD converters, Concept of Digital comparator ,study of 7485. Circuit design using state table/K-map: Design of Full adder, Full subtractor, Decimal to BCD encoder ,BCD to seven segment decoder, Concept of excitation table, Design of 2 bit synchronous up counter, 3 bit random sequence generator .	**12**
II	**MEMORYORGANISATION** Introduction, Characteristics of memory systems, Vertical & horizontal Memory expansion(increasing the capacity, increasing word size),Memory hierarchy, Cache memory, Memory mapping techniques, Virtual Memory, Memory management concepts (paging and segmentation), Introduction to USB storage device.	**12**
III	**I/O ORGANISATION** Need of interface, I/O mapped I/O, Memory mapped I/O , Input output Interface, Asynchronous data transfer. Modes of transfer, Priority Interrupts, DMA Controller , Input output Processor, Serial communication: Synchronous, asynchronous and their datatransmission formats, , General block diagram of UART.	**12**
IV	**CPU ORGANISATION** Introduction, General register organization, Stack Organization, , Instruction formats,Arithmetic and Logic Unit (One bit and multiplebit), Bit processor, Concept of RISC & CISC, Concept of pipeline.	**12**

Reference Books:

1. Fundamental of Digital electronics : R.P. Jain ,
2. Digital design : M. Morris Mano, Prentice-Hall of India
3. Computer Organization -J.P. Hays TMH
4. Computer System Architecture : Morris Mano, Prentice-Hall of India
5. Digital system Design: Nirali /Techmax
6. Digital Electronics - Anandkumar
7. The Intel Microprocessors : Barry B. Brey- Pearson Education Asia
8.DigitalSysytem Hardware : H R Arvind, VishakhaBapat (Vision Publications)

Course Code: GEC-304: Electronics Paper-VI
Course Title: Computer Instrumentation
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	**MEASURMENTS AND TRANSDUCERS:** Measurements, Units, Standards, Instrument, instrumentation, Calibration, Block diagram of Instrumentation system. Transducers ,Sensors, Classification of transducers, Characteristics of Transducers, Selection Criteria, examples of different transducers. ***Temprature :*** Thermocouple, RTD, LM35,. ***Pressure/Force :*** Strain-Gauge, Piezo-Electric, LVDT, Capacitive, Load Cell . ***Optical :*** Photoconductive Cells, Photovoltaic Cell,PIR sensor.	**12**
II	**SIGNAL CONDITIONING AND DATA CONVERTORS** Introduction, Whetstones bridge, Pre amplifiers, Filters (LP, HP, Band Pass and Reject - only frequency response) ADC: (SAR ,Dual Slope,), DAC : (Binary weighted , R-2R). Study of IC ADC 0809, DAC 0808. Instrumentation Amplifier using OP. AMP., Differential Bridge Amplifier.	**12**
III	**ACTUATORS AND DATA ACQUISITION SYSTEMS** Definition & Principle, Electrical Actuators : Relays, Motors : AC, DC, Servo, Stepper,Generalized Data Acquisition System, Signal conditioning for DAS, Types of DAS, Multiplexing, Sample and Hold Circuit, Computer based DAS, Data Logger.	**12**
IV	**DIGITAL INSRUMENTS AND DISPLAY DEVICES** Digital Mulitmeter, Digital Frequency Meter, Universal Counter, Digital Tachometer, Digital Phase Meter, Block Diagram of CRO, Concept of DSO. LCD technique ,Concepts of LCD, LED ,OLED Displays.(comparative study) Strip chart recorder (X-T), X-Y recorder , Potentiometric recorder, Bridge type recorder.	**12**

Reference Books

1. Electronic Instrumentation -Kalsi TMH
2. Transducers & Instrumentation -Murthy PHI (Unit 1)
3. Instrumentation Measurements &Analysis-Nakra&Chaudhry TMH
4. Instrumentation Devices & Systems -Rangan, Sarma, Mani TMH

Sem-IV
Course Code: GEC-403: Electronics Paper - VII
Course Title:Microcontroller Architecture and Programming
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	**INTRODUCTION TO MICROCONTROLLER** Comparison of Microcontroller & Microprocessor, Survey of 4-Bit, 8-Bit, 16-Bit And32-Bit Microcontrollers and their application areas, Study of 8051 and its Family(89C51, 8031, 8032, 8052, 8751, Phillips (RD2)89C51VRD2). Architecture of 8051:Block Diagram of 8051 and Study of Internal Blocks, Reset and Clock, Registers, Flags and Internal Memory, SFR, I/O Ports.	**12**
II	**8051 INSTRUCTION SET** Study of 8051 Instruction Set and Addressing Modes, Data transfer, Arithmetic, Logical, JUMP, Loops & CALL instructions, Bit manipulation Instructions.	**12**
III	**FACILITIES IN 8051** **Timer and Counter:** Timer and Counters, Timer modes, Programming the timers inMode 1,Mode 2 using assembly and C. Time delay generation. **Serial Port :** Serial port of 8051, RS-232 standard and IC MAX–232, Baud ratein 8051, programming for transmitting character through serial port using assembly and C.	**12**
IV	**INTERFACING METHODES** Interfacing with 8051: LED, Switch, Relay, Opto-coupler, Thumb wheel switch and Seven segment display . Stepper Motor , DC motor (PWM), LCD (16 X 2) , with respective programming in assembly language OR embedded C for all.	**12**

Reference Books

1. 8051 Microcontrollers 2nd Edition -Mazidi Pearson
2. 8051 Microcontroller -Ayala K.J.
3. 8051 Microcontroller -Deshmukh Ajay TMH

Course Code: GEC-404 : Electronics Paper - VIII
Course Title: Communication Techniques
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	**INTRODUCTION TO ELECTRONIC COMMUNICATION** Importance of Communication, Elements of Communication system, Electromagneticspectrum, Types of communication, Serial communication, Concepts of communication system: Signal bandwidth, channel bandwidth, data rate, baud rate, Nyquist theorem, Signal to noise ratio and channel capacity, Types of Noise.Error handling code- Hamming code, Shannon theorem, and concept of companding.	**12**
II	**ANALOG MODULATION** Introduction to concepts of modulation and demodulation. *Modulation techniques:* ***Analog***: Amplitude, Phase and Frequency modulation, Circuit diagram and working of , a) Transistorized Amplitude Modulator b) Diode Amplitude Demodulator. Equation of amplitude modulated wave (derivation not expected)Modulation Index, Frequency spectrum, and Power distribution. (derivation not expected) (Phase and frequency modulation circuits are not expected).	**12**
III	**DIGITAL MODULATION AND MULTIPLEXING TECHNIQUES** ***Digital:*** Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM), Delta modulation Block diagram and working of each. Concept of ASK, FSK, BPSK ,Block diagram of MODEM using FSK. Study of multiplexing: Space division multiplexing ,Time division multiplexing , Frequency Division Multiplexing, Code division multiplexing.	**12**
IV	**WIRELESS COMMUNICATION SYSTEMS** Need of wireless communication systems.Introduction to mobile communication, Cellular concept, Working of GSM, Hand over. Introduction to GPRS. Introduction to RFID, Zigbee, Bluetooth and Wi-Fi . (Comparison based on Range, Data rate, Frequency, Power).	**12**

Recommended Books:

1. Communication Electronics : Principles and Applications. L.E.Frenzel3rd Edn.
2. Modern Electronic Communication. G.M. Miller 7th Edition.
3. Mobile Communication Jochen Schiller 2nd Edition.
4. Wireless Communications: Principles and Practice. Rappaport
5. Wireless Communications and Networks. William Stallings

LAB :6ELECTRONICS PRACTICAL (Group A)

Sr. No.	Title of practical
	Part-I
1	Built& study 4 × 4 Diode matrix ROM
2	Built& study Gray to binary and Binary to Gray converter
3	Built& study 2 –bit serial Up down counter (7473)
4	Built& study 4-bit Ring & Johnson counter using D/JK Flip-FlopICs
5	Built& study Decimal to BCD as Priority Encoder using 74147
6	Built& study Digital single Bit / Magnitude Comparator.
7	Built& study 4-bit asynchronous counter using Flip-Flop ICs
8	Built& study- 4 bit Shift Register (SISO) using D/JK Flip-Flop ICs
9	Built& study 2 to 4 Decoder using 3 input NAND gate.
10	Identification of components on motherboard and its specifications
Part-II	
11	Study DAC (R-2R Ladder)
12	Study ADC (3 bit Flash) IC or Discrete
13	Study Analog Multiplexers (8:1/4:1)
14	Study characteristics of LM 35/ PT-100
15	Study Instrumentation amplifier using Op. Amp.
16	Built and test LDR based light control system
17	Built& study of op.amp as integrator and differentiator
18	Built and test Precision Rectifier using Op. Amp.
19	Study of ON/OFF Temperature controller (LM34/LM35/AD590)
20	Built and test DC motor control using Relay

- **Note** :At least any 8 Experiments from each Part

LAB :6ELECTRONICS PRACTICAL (Group B)

Sr. No.	Title of practical
	Part-III
1	Interfacing of LED / Relay /Optocoupler with 8051
2	Interfacing of THUMB WHEEL SHITCH / 7-SEGMENT DISPLAY with 8051
3	Time delay generation using timers (Mode 1 OR 2) of 8051(use simulator or kit)
4	Interfacing of Stepper motor with 8051
5	Interfacing of DC motor (PWM) with 8051
6	Arithmetic operations using 8051 C (Use 8051 Simulator)
7	Logical operations using 8051 C (Use 8051 Simulator)
8	Interfacing of DAC with 8051 to generate Triangular & Square / Staircase wave
9	Interfacing of ADC with 8051
10	Interfacing LCD with 8051
	Part - IV
11	Study of Amplitude Modulator and Demodulator.
12	Study of Frequency Modulator.
13	Study of F S K modulator.
14	Study of Pulse Amplitude Modulation.
15	Study of A S K Modulator.
16	Study of Pulse Width Modulation
17	Study of B P S K Modulator
18	Generation of Triangular & Square waves as Carrier using 741
19	Study of R.F. (LC) oscillator using transistor
20	Built& study TDM

- **Note:** At least any8 Experiments from each Part

Nature of theory question paper:

As per regular B.Sc. Programme.

B.Sc.II Computer Science Entire
ELECTRONICS
Total **Workload**
Semester III

Paper No.	Code	Title of the Paper	Total Marks	Lectures Per week
V	GEC-303	Computer Organization	50	4
VI	GEC-304	Computer Instrumentation	50	4

Semester IV

Paper No.	Code	Title of the Paper	Total Marks	Lectures Per week
VII	GEC-403	Microcontroller Architecture & Programming	50	4
VIII	GEC-404	Communication Techniques	50	4

Practical (Annual)

Title of the Paper	Total marks	Lectures per week
Practical Paper	100	4

*Note :4 Lectures per week per 20 students batch.

Examination scheme for practical

1) The practical examination shall carry 100 marks.

2) Every student has to perform total four experiments, one experiment from each Part I and Part II (Group – A) and one experiment from each Part III and Part IV (Group-B).

3) Each session of practical examination shall be of four hours. There shall be two sessions per day.

4) Each batch shall be called for examination only for one session per day. The second session shall be performed on the next day.

Distribution of Marks:

Group -A		Group -B		Journal	Total
Part- I	Part - II	Part - III	Part - IV		
22	22	22	22	12	100

Nature of Practical Paper :

Model Practical Question Paper (Slips) shall be provided by Shivaji University, Kolhapur.

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B.Sc. Computer Science Entire Part II (CBCS)
Mathematics(Sem. III & IV)
Syllabus to be implemented from June 2019 onwards.

1. TITLE: Mathematics

2. YEAR OF IMPLEMENTATION : Revised Syllabus will be implemented from June 2019 onwards.

3. DURATION : B.Sc. in Computer Science Entire Part- II The duration of course shall be one year and Two semesters.

4. PATTERN: Pattern of examination will be semester.

5. STRUCTURE OF COURSE:

Mathematics (Semester III)

Code	Paper	Name of Paper	Marks
GEC-305	Paper- V	Linear Algebra	50 (Theory)
GEC-306	Paper- VI	Numerical Methods	50 (Theory)

Mathematics (Semester IV)

Code	Paper	Name of Paper	Marks
GEC-405	Paper- VII	Computational Geometry	50 (Theory)
GEC-406	Paper- VIII	Operation Research	50 (Theory)

Practical Examination (Annual)

Code	Paper	Name of Paper	Marks
LAB-7	--	Practical Examination Based on GEC- 305,306 & 405, 406	100

EQUIVALENCE IN ACCORDANCE WITH TITLIES AND CONTENTS OF PAPERS (FOR CBCS SYLLABUS)

Sr. No.	Title of Old Paper	Code	Paper No.	Title of New Paper
SEMESTER III				
1	Paper- V Linear Algebra	GEC-305	V	Linear Algebra
2	Paper- VI Numerical Methods	GEC-306	VI	Numerical methods
SEMESTER – IV				
3	Paper- VII Computational Geometry	GEC-405	VII	Computational Geometry
4	Paper- VIII Operation Research	GEC-406	VII	Operation Research
Practical Examination ANNUAL PATTERN				
5	Practical III &IV	LAB-7	---	Lab Course based on GEC- 305,306 & 405, 406

B.Sc.Computer Science Entire Part II (CBCS) Mathematics

Detail syllabus of semester III and IV

Semester-III

Course Code: GEC-305: Mathematics Paper-V

Course Title: Linear Algebra

Total Contact Hours: 48 hrs (60 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	**Linear Equations and Matrices** 1.1 Matrices 1.2 Matrix Transformations 1.3 Linear systems 1.4 Results on system of linear equations and invertible matrices (statements only) 1.5 Solutions of Systems of Linear Equations 1.5.1 Gaussian Elimination method 1.5.2 Gauss-Jordan method 1.6 LU- Factorization method	**12**
II	**Vector space** 2.1 Group ,Ring ,Integral Domain ,Field (only definitions) 2.2 Vector Spaces 2.3 Subspaces 2.4 Linear Dependence and Independence 2.5 Basis and Dimension 2.6 Row space , Column space and Null space 2.7 Rank and Nullity of a matrix 2.8 Inner product space 2.8.1 Definition and examples 2.8.2 Properties of inner product 2.8.3 Orthonormal Basis in R 2.8.4 Gram-Schmidt process	**12**
III	**Eigen values, Eigen vectors and diagonalization** 3.1 Eigen values and Eigen vectors 3.2 Diagonalization 3.3 Cayley Hamilton theorem (Statement only) and examples.	**12**
IV	**Linear Transformations and Matrices** 4.1 Definitions and Examples 4.2 The Kernel and Range of a Linear transformation 4.3 The Matrix of a Linear Transformation	**12**

Note :- All theorems in sections 1.4 , 2.6 , 2.7 , 3.2 , 4.3 are without proof

Recommended Book

1. Elementary Linear Algebra with Applications, Howard Anton, Chris Rorres, John Wiley and sons., 7th Edition (1994).

REFERENCE BOOKS

1. Linear Algebra ,Schaum Series.
2. A textbook of Matrices, Shanti Narayan, P. K. Mittal, S. Chand.
3 . Topics in Algebra ,I.N.Herstein

Course Code: GEC-306: Mathematics Paper-VI
Course Title: Numerical Methods
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	Solution of Non – linear Equations 1.1 Introduction 1.2 Bisection method : Algorithm ,graphical representation and examples 1.3 Regula – Falsi method : Algorithm ,graphical representation and examples 1.4 Newton Raphson method : Algorithm ,graphical representation and examples 1.5 Secant method : Algorithm and examples	**12**
II	Numerical Interpolation 2.1 Interpolation , Equally and Unequally spaced data 2.2 Definitions of forward difference (Δ) ,Backward difference (∇) and Shift operator (E) 2.3 Elementary results on Δ , ∇ , E 2.4 Fundamental theorem of difference calculus (with proof) 2.5 Newton – Gregory Forward interpolation formula (with proof) and Examples 2.6 Newton – Gregory Backward interpolation formula (with proof) and Examples 2.7 Lagrange's interpolation formula (with proof) and examples	**12**
III	Numerical Intgration 3.1 Introduction of numerical integration 3.2 General Quadrature formula (with proof) 3.3 Trapezoidal rule (with proof) and examples 3.4 Simpson's $1/3$ rule (with proof) and examples 3.5 Simpson's $3/8$ rule (with proof) and examples 3.6 Weddle's rule (with proof) and examples 3.7 Romberg method and examples	**12**
IV	Solution of first order ordinary differential equation 4.1 Introduction of first order ordinary differential equation 4.2 Euler's method and examples 4.3 Euler's modified method and examples 4.4 Runge – Kutta method (second and fourth order) and examples 4.5 Predictor – Corrector formula (with proof) and examples	**12**

Recommended Books:

1. Introductory Methods of Numerical Analysis, S.S. Sastry, 3rd edition,Prentice Hall of India, 1999.
2. Finite differences and Numerical Analysis, H.C. Saxena, S. Chand and Company.

Reference Books:

1. Numerical Analysis, Balguruswamy.
2. Calculus of Finite Differences and Numerical Analysis, P. P. Gupta,G. S. Malik and S. Gupta, Krishna Prakashan Media (P) Ltd.
3. Computer oriented Numerical methods, A. B. Auti Tech-max publications

Semester-IV
Course Code: GEC-405 : Mathematics Paper – VII
Course Title: Computational Geometry
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	**Two dimensional transformations** 1.1 Introduction. 1.2 Representation of points. 1.3 Transformations and matrices. 1.4 Transformation of points. 1.5 Transformation of straight lines. 1.6 Midpoint transformation. 1.7 Transformation of parallel lines. 1.8 Transformation of intersecting lines. 1.9 Transformation: rotations, reflections, scaling, shearing. 1.10 Combined transformations. 1.11 Transformation of a unit square. 1.12 Solid body transformations. 1.13 Transformation and homogeneous coordinates. Translation. 1.14 Rotation about an arbitrary point. 1.15 Reflection through an arbitrary line. 1.16 Projection – a geometric interpretation of homogeneous co-ordinates. 1.17 Overall Scaling. 1.18 Point at infinity.	**12**
II	**Three dimensional transformations** 2.1 Introduction. 2.2 Three dimensional – Scaling, shearing, rotation, reflection, translation. 2.3 Multiple transformations. 2.4 Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space. 2.5 Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes. 2.6 Affine and perspective transformations. 2.7 Orthographic projections. 2.8 Axonometric projections. 2.9 Oblique projections. 2.10 Single point perspective transformations. 2.11Vanishing points.	**12**
III	**Plane Curves** 3.1 Introduction. 3.2 Curve representation. 3.3 Non – parametric curves. 3.4 Parametric curves. 3.5 Parametric representation of a circle and generation of circle. 3.6 Parametric representation of an ellipse and generation of ellipse. 3.8 Parametric representation of a parabola and generation of parabolic segment. 3.9 Parametric representation of a hyperbola and generation of hyperbolic segment.	**12**

IV	**Space curves** 4.1 Bezier Curves – Introduction, Definition, Properties (without proof), 4.2 Curve fitting (upto n = 3), 4.3 equation of the curve in matrix form (upto n = 3)	**12**

Recommended Book:

1. Mathematical elements for computer graphics, F. David and J. Alan Adams (McGraw Hill International Edition)

Reference Books:

1. Computer graphics, Schaum series.
2. Computer Graphics handbook,Geometry and Mathematics, M.E.Mortenson, Industrial Press Inc.

Course Code: GEC-406 : Mathematics Paper – VIII

Course Title: Operation Research
Total Contact Hours: 48 hrs (60 lectures of 48 min)
Credits: 02 Teaching Scheme: Theory : 04 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
I	Introduction to operation Research 1.1 Basics of operation research 1.2 Different definitions of operation research 1.3 Characteristics , scope , limitations of operation research	**12**
II	Linear Programming Problem 2.1 Basics definitions 2.2 Solution of L.P.P by Simplex method and examples 2.3 Solution of L.P.P by Big – M method and examples 2.4 Definition of Dual Problem 2.5 Relationship between solutions of primal and dual problems	**12**
III	Transportation and Assignment problem 3.1 Basics of Transportation problem 3.2 Basic Definitions 3.3 Initial Solution 3.3.1 North – West corner method and examples 3.3.2 Matrix minima method and examples 3.3.3 Vogel's approximation method and examples 3.4 MODI method and examples 3.5 Maximization in transportation problem and examples 3.6 Unbalanced transportation problem and examples 3.7 Introduction to Assignment problem 3.8 Hungarian method and examples 3.9 Maximization in Assignment problems and examples 3.10 Unbalanced Assignment problem and examples 3.11 Assignment problems with restrictions and examples	**12**
IV	Theory of Games 4.1 Basics definitions 4.2 Saddle point and examples 4.3 Algebraic method for $\mathbf{2 \times 2}$ size game and examples 4.4 Arithmetic method for $\mathbf{2 \times 2}$ size game and examples 4.5 Principal of dominance , Dominance method and examples 4.6 Sub-game method for $\mathbf{2 \times n \& m \times 2}$ size game and examples 4.7 Graphical method for $\mathbf{2 \times n \& m \times 2}$ size game and examples	**12**

Recommended Book:

1. Operations Research, S. D. Sharma

Reference Books:

1. Principles of Operations Research, H. M. Wagner,Prentice Hall of India.
2. Operations Research, Gupta and Hira.
3. Operations Research, J K Sharma (second edition)

Practical Annual: Mathematics Lab-7

LAB-7– Lab Course based on GEC- 305,306 & 405, 406

(Based on GEC- 305 and 306) Linear Algebra and Numerical methods.

Practical number	Title of practical
1	Gauss Elimination method
2	Gauss Jordan method
3	LU Factorization method
4	Gram Schmidt process
5	Eigen values and Eigen vectors
6	Diagonalizable Matrix
7	Verification of Cayley Hamilton theorem
8	Inverse of a matrix using Cayley Hamilton Theorem
9	Bisection method
10	RegulaFalsi method and Newton Raphson method
11	Newton Forward and Backward interpolation
12	Lagrange's interpolation
13	Trapezoidal , Simpson $^1/_3$, and Simpson $^3/_8$ rule
14	Romberg method
15	Computer programme for 1) Euler's method 2) Euler's modified method 3) RungeKutta method (second and fourth order)
16	Computer Programme for 1) Trapezoidal rule 2) Simpson $^1/_3$ rule 3) Simpson $^3/_8$ rule 4) Weddle Rule

(Based on GEC- 405 and 406)- Computational Geometry and Operation Research

Practical number	Title of practical
17	Plane Linear transformation 1 Scaling , Shearing , Reflection and Rotation about origin
18	Plane Linear transformation 2 Rotation about arbitrary point , Reflection through arbitrary line Combined transformation matrix
19	Space linear transformation 1 Scaling , Shearing and Rotation about Co – ordinate axis Reflection through Co – ordinate planes , Translation Multiple transformations , Rotation about a line parallel to Co – ordinate axis , Rotation through planes which are parallel to Co – ordinate planes , Reflection through arbitrary planes (algorithm only)
20	Space linear transformation 2 Projections : orthographic , Axonometric ,oblique , Single point perspective
21	Plane Curves 1 Generation of points on circle and ellipse (Algorithm and Examples)
22	Plane Curves 2 Generation of points on parabola and hyperbola (Algorithm and Examples)
23	Bezier Curve : Generation of curve with $n = 2, 3$
24	Linear programming Problem 1 Simplex method (maximization and minimization problems)
25	Linear programming Problem 2 Big – M method (maximization and minimization problems)
26	Initial solution of transportation problem North – West Corner method , Matrix minima method Vogel's approximation method
27	MODI method
28	Maximization in transportation problem , Unbalanced transportation problem
29	Hungarian method
30	Maximization in assignment problem , Unbalanced assignment problem
31	Game Theory 1 Two person zero sum game with saddle point Arithmetic method , Algebraic method
32	Game Theory 2 Sub game method , Graphical method

B.Sc.II Computer Science Entire

(MATHEMATICS) Workload

Theory

Semester III

Paper No.	Title of thePaper	TotalMarks	PeriodsPer week
V	LinearAlgebra	50	4
VI	NumericalMethod	50	4

Semester IV

Paper No.	Title of the paper	Total marks	PeriodsPer week
VII	ComputationalGeometry	50	4
VIII	OperationResearch	50	4

Practical(Annual)

Title of the paper	Total marks	Periods per week per batch
Practical III & IV	100	4

*Note :4 hours per week per 20 students batch.

Work – Load

(i) total teaching periods for paper -V,VI are 8(eight) per week.
4(four) periods per paper per week. For semester III
(ii) total teaching periods for paper - VII,VIII are 8(eight) per week.
4(four)periods per paper per week. For semester IV
(iii) total teaching periods for practical course in mathematics -III & IV, 8 hours per week per 20 students batch

Scheme of Examination:

Theory

- The theory examination shall be conducted at the end of each semester.
- The theory paper shall carry 50 marks.
- The practical examination shall be conducted at the end of each year.
- The practical paper shall carry 100 marks.
- The evalution of the performance of the student in theory shall be on the basis of examination.

Nature of theory question paper

- As per regular B.Sc. Programme.

Practical

- The practical paper shall carry 100 marks.
- There shall be five questions carrying 25marks each. Student has to attempt three questions. Questions no.1 is compulsory and any two questions from questions no.2 to questions no.5
- 10 marks for journal and 15 marks for viva.
- The duration of practical examination will be four hours.

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Sem-III

Course Code: AECC-C: Environmental Studies
Course Title: Environmental Studies (Theory Paper – 70 Marks)

Sem-IV
Course Code: AECC-D: Environmental Studies
Course Title: Project 30 Marks

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