Choice Based Credit System (CBCS)

Maharaja Ganga Singh University

Bachelor of Computer Applications (BCA)

(Semester System)

2023-24

Undergraduate Programme

(Effective from Academic Year 2023-24)

SYLLABUS
SCHEME OF EXAMINATION AND
COURSES OF STUDY

Disclaimer: The CBCS syllabus has been approved by the Academic Council on __.__.2023 and Board of Management on __.__.2023. Any query may kindly be addressed to the concerned Faculty.

Preamble

Considering the curricular reforms as instrumental for desired learning outcomes, Maharaja Ganga Singh University made a rigorous attempt to revise the curriculum of postgraduate and undergraduate programs in alignment with the National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions. The process of revising the curriculum could be prompted by the adoption of the "Comprehensive Roadmap for Implementation of NEP". The roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and an indicative timeline for major academic reforms. The University Grants Commission (UGC) has devised a series of regulations and directives over time with the intention of enhancing the higher education system's quality and enforcing minimum standards in Higher Educational Institutions (HEIs) throughout India. The recent academic reforms suggested by the UGC have contributed to an overarching enhancement of the higher education system.

With NEP-2020 in background, the revised curricula articulate the spirit of the Policy by emphasizing upon- integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points, integration of extracurricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical, vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. The University has also developed consensus on adoption of Blended Learning with component of online teaching and face to face classes for each programme.

Choice-Based Credit System (CBCS)

The Choice Based Credit System (CBCS), a part of the academic reform process to enhance the quality of education and facilitate the transferability of students from one University/institution to another at the national and international level, provides substantive autonomy to teachers to formulate their own curricula and enable them to introduce innovations in teaching and learning process and upgrade the overall quality of higher education. The CBCS provides scope for Comprehensive and Continuous Evaluation (CCE) of students and encourages them to learn. The CBCS provides a cafeteria-type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

The grading system is widely regarded as an improvement over the traditional marks system, which is why leading institutions in India and abroad have adopted it. Thus, there's a strong rationale for establishing a consistent grading system. This would facilitate seamless student mobility among institutions within the country and abroad, while also allowing prospective employers to accurately assess students' performances. To achieve the desired standardization in the grading system and the method for calculating the Cumulative Grade Point Average (CGPA) based on students' examination results, the UGC has devised these comprehensive guidelines.

Outline of Choice Based Credit System

(https://www.ugc.gov.in/pdfnews/8023719_guidelines-for-cbcs.pdf)

1. **Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
2. **Elective Course:** Generally a course that can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

2.1 **Discipline-Specific Elective (DSE) Course: Elective** courses may be offered by the main discipline/subject of study is referred to as Discipline-Specific Elective. The University/Institute may also offer discipline-related Elective courses of an interdisciplinary nature (to be offered by the main discipline/subject of study).

2.2 **Dissertation/Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.

2.3 **Generic Elective (GE) Course:** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. P.S.: A core course offered in a discipline/subject may be treated as an elective by another discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

3. **Ability Enhancement Courses (AEC):** The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement; i. Environmental Science and ii. English/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on training, competencies, skills, etc.

3.1 Ability Enhancement Compulsory Courses (AECC): Environmental Science, English Communication/MIL Communication.

3.2 Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

4. Research Component in Undergraduate Courses

Project work/Dissertation is considered as a special course involving the application of knowledge in solving / analysing /exploring a real-life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline-specific elective paper.

Structure of Programme

Bachelor in Computer Application (BCA)

Admission Criteria

Admission rules to the course will be as per Government / University policy declared for undergraduate science programs from time to time.

Teaching and Examination Scheme for
Bachelor in Computer Application
Session 2023-25
Examination 2024-26

Semester I										
Paper Code	Paper Name	Code	L	T	P	Total Credits	Maximum Marks			Minimum Passing Marks(%)
							Internal	External	Total	
BCA4.5AECCT11	(English/Hindi/ MIL)	AECC	2	0	0	2		100		36 Non-CGPA S/NS*
BCA4.5DCCT12	Computer Fundamentals	DCC	3	1	0	4	30	80	150	36
BCA4.5DCCP12	Computer Fundamentals lab	DCC	0	0	2	2		40		36
BCA4.5DCCT13	C++	DCC	3	1	0	4	30	80	150	36
BCA4.5DCCP13	C++ Lab	DCC	0	0	2	2		40		36
BCA4.5DCCT14	Computer Organization	DCC	5	1	0	6	30	120	150	36

Semester II										
Paper Code	**Paper Name**	**Code**	**L**	**T**	**P**	**Total Credits**	**Maximum Marks**			**Minimum Passing Marks(%)**
							Internal	**External**	**Total**	
BCA4.5AECCT21	Environmental Science	**AECC**	2	0	0	2		100		36 Non-CGPA S/NS*
BCA4.5DCCT22	Internet Programming	**DCC**	3	1	0	4	30	80	150	36
BCA4.5DCCP22	Internet Programming lab	**DCC**	0	0	2	2		40		36
BCA4.5DCCT23	DBMS	**DCC**	3	1	0	4	30	80	150	36
BCA4.5DCCP23	DBMS Lab	**DCC**	0	0	2	2		40		36
BCA4.5DCCT24	Mathematics for Computer Science	**DCC**	5	1	0	6	30	120	150	36

S/NS*=Satisfactory or Unsatisfactory, ** A candidate shall be required to obtain 36% marks to pass in theory, practical and internals separately.

- For Internal Evaluation of 20 Marks overall (no bifurcation into theory and practical)-please decide your criteria (Suggestive: 05 Marks for theory paper, 05 Marks for practical paper, 05 Marks for assignment/ seminar, and 05 Marks for Logical thinking/application of knowledge and skills)
- Each practical exam is to be conducted by two examiners one External and one Internal. The external examiner should be a senior lecturer from the jurisdiction of MGS University. External Examiner will prepare question paper of Practical Examination. Students have to perform exercises on the computer. Exercise must be written in answer books in proper documentation.
- Bifurcation of 40 marks for Practical paper will be as follows-
  3 practical questions 30 marks each
  Lab File: 5 marks
  Viva voce: 5 marks

Semester I

Course Code: BCA4.5DCCT12
Type of the course: Discipline Specific Core Course I of Semester I
Title of the Course: Computer Fundamentals
Level of the Course: NHEQF Level 4.5
Credit of the Course: 4
Delivery sub-type of the course: Theory 3. Tutorial 1
Pre-requisites and requisites of the course: Student enrolled and registered in UG Programme first semester.

Duration of Exam: 3 Hours
Maximum Marks: 150
Internal Exam: 30 Marks
Theory Exam: 80 Marks
Practical Exam: 40 Marks

Objectives of the course: Course Objectives:

1. To understand the characteristics of computers
2. To know about the generations of computers
3. To have knowledge about computer languages
4. To understand the basics of an operating system
5. To be acquainted with word processor, spreadsheet, and presentation
6. To understand and apply the concept of algorithms and algorithm analysis
7. To know about some unsolved problems of computer science

Course Learning Outcomes:

After completion of this course, the student will be able to -

1. Understanding of the characteristics of computers
2. Know about the generations of computers
3. Having knowledge of computer languages
4. Understanding of the basics of operating system
5. Acquaintance with a word processor, spreadsheet, and presentation
6. Understanding and ability to design algorithms
7. Know about some unsolved problems of computer science

Course Contents

Unit I

Basics: Block Diagram, characteristics, generations of computers, classification of computers; Binary number system, Limitations of Computers, Primary and secondary memory, Input and output devices; Computer languages: Machine language, assembly language, higher level language, 4GL. Introduction to Compiler, Interpreter, Assembler, System Software, and Application Software.

Unit II

Operating System: Features of Windows, Linux, Macintosh, Android. Open source software: concept and examples.
Word Processing software: different formats for saving a word document, creating, and editing documents and related operations, formatting features and related operations, spelling and grammar checker, headers and footers, creating and managing tables; printing, macros, mail merge, equation editor.

Unit III

Spreadsheet Software: Workbook, worksheets, datatypes, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references.

Unit IV

Presentation Graphics Software: Templates, views, formatting slides, slides with graphs, animation, using special features, presenting slide shows.

Unit V

Google Docs- usage and creating a document, Google Sheets- usage and creating a sheet, Google Slides- usage and creating slides, Google Forms- usage and creating a form, Google Meet- attending and hosting a meeting.

Suggested Readings:

1. P.K Sinha, “Computer Fundamentals”, 2004
2. Rajaraman, Fundamentals of Computers, Fourth edition, Prentice Hall India Pvt. Limited, 2006
3. Peter Norton, “Introduction to Computers”,4th Edition, TMH Ltd, New Delhi, 2017.
4. R.G. Dromey, ”How to solve it by Computers”, Pearson Publishers, New Delhi, 2007.
5. Dorothy House, “Microsoft Word, Excel, and PowerPoint: Just for Beginners, 2015

Web resources:

1. https://documentation.libreoffice.org/en/english-documentation/getting-started-guide/
2. https://www.coursera.org/learn/creative-problem-solving
3. http://web.mit.edu/rsi/www/pdfs/new-latex.pdf
4. https://www.latex-project.org/help/books/
5. https://support.google.com/docs/?hl=en#topic=1382883
6. https://en.wikipedia.org/wiki/List_of_unsolved_problems_in_computer_science
7. https://www.claymath.org/millennium-problems

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Course Code: BCA4.5DCCT13
Type of the course: Discipline Specific Core Course I of Semester I
Title of the Course: C++
Level of the Course: NHEQF Level 4.5
Credit of the Course: 4
Delivery sub-type of the course: Theory 3. Tutorial 1
Pre-requisites and requisites of the course: Student enrolled and registered in UG Programme first semester.

Duration of Exam: 3 Hours
Maximum Marks: 150
Internal Exam: 30 Marks
Theory Exam: 80 Marks
Practical Exam: 40 Marks

Objectives of the course: Course Objectives:
1. To declare, initialize, and process variables, constants, and arrays
2. To read and print values from the keyboard
3. To create statements for decisions and loops
4. To define functions and return values
5. To create classes, objects, and constructors
6. To understand and apply OO design concepts

Course Learning Outcomes:
After completion of this course, the student will be able to -
1. Declare, initialize, and process variables, constants, and arrays
2. Read and print values from the keyboard
3. Create statements for decisions and loops
4. Define functions and return values.
5. Create classes, objects, and constructors.
6. Understand and apply OO design concepts.

Course Contents

Unit I

Object Oriented System**:** Difference Between Procedural and Object Oriented Languages, Object Oriented Paradigm, Inheritance, Polymorphism, Abstraction, Encapsulation, Benefits and Application of Oops. Introduction to C++: Character Set, Token, Constants, Variables and Data Types, Enumeration Types, Operators, Expressions, Operator Precedence and Associativity, Input, Output, Conditional Statements, Scope of Variables, Type Conversion.

Unit II

Iteration, Break, Continue, goto; Pointers**:** Introduction, implementation advantage and disadvantage**.** Functions **-** Standard and User-Defined Function, Recursive Function, Passing By Value And Reference, Function Overloading Pointer and Function: Function Returning Pointer, Passing Pointer as argument, Reference and Functions. Structures and Pointers. Containers.

Unit III

Array**:** introduction, advantage, One, Two and Multidimensional, Passing Array to a Function, Array and Pointers: Pointer to One and Two Dimensional Arrays, Dynamic Arrays, array containers, Array of Pointers, pointers using String Processing.Class: Introduction to Class and Object, Declaring Members and Methods in a class, declaring objects.

Unit IV

Functions and objects, Inline Function, Friend Functions and Its Usage, Abstract Class, Function Overriding. Constructor and Destructor**-** Needs and Its Usage, Types of Constructors, Destructor, Static Data Members and Methods. Inheritance - Need of Inheritance, Types of Inheritance and its implementation.

Unit V

Operator Overloading: Need and Rules of Operator Overloading, Overloading Through Member Function and Friend Function. Compile Time and Run Time Polymorphism- Virtual Function and virtual class. Exception Handling. Templates, Additional features of C++11, C++14 and C++17.

References:

1. Object Oriented Programming With C++ by E. Balagurusamy (Tata Mcgraw Hill)
2. C++ The Complete Reference by Herbert Sehildt (Tata Mcgraw Hill)
3. Object Oriented Programming With C++ by Schaum Series (Tata Mcgraw Hill)
4. C++11 for Programmers (Deitel Developer) by Paul J. Deitel (Author), Harvey M. Deitel, Prentice Hall; 2nd edition
5. Professional C++ by Marc Gregoire, Nicholas A. Solter, and Scott J.Kleper (Goodreads Publications)
6. A Tour of C++ by Bjarne Stroustrup, 2018
7. C++17 in Detail by Bartłomiej Filipek

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Course Code: BCA4.5DCCT14
Type of the course: Discipline Specific Core Course I of Semester I
Title of the Course: Computer Organization
Level of the Course: NHEQF Level 4.5
Credit of the Course: 6
Delivery sub-type of the course: Theory 5. Tutorial 1
Pre-requisites and requisites of the course: Student enrolled and registered in UG Programme first semester.

Duration of Exam: 3 Hours
Maximum Marks: 150
Internal Exam: 30 Marks
Theory Exam: 120 Marks

Objectives of the course: Course Objectives:
1. To understand the structure, function, and characteristics of computer systems.
2. To understand the design of the various functional units and components of computers.
3. To Identify the elements of modern instruction sets and their impact on processor design.
4. To acquire the ability to explain the function of each element of a memory hierarchy,
5. To identify and compare different methods for computer I/O

Course Learning Outcomes:
After completion of this course, the student will be able to -
1. Understand the structure, function, and characteristics of computer systems.
2. Understand the design of the various functional units and components of computers.
3. Identify the elements of modern instruction sets and their impact on processor design.
4. Explain the function of each element of a memory hierarchy,
5. Identify and compare different methods for computer I/O.

Course Contents

Unit I

Components of a Computer: Processor, Memory, Input-Output Unit, Difference between Organization and Architecture, Hardware Software Interaction. **Number System:** Concept of Bit and Byte, types and conversion. **Complements:** 1's complement, 2's complement. **Binary Arithmetic:** Addition, overflow, subtraction.

Unit II

Logic gates: Boolean Algebra, Map Simplification. **Combinational circuits**: Half Adder, Full Adder, Decoders, Multiplexers. **Sequential circuits:** Flip Flops- SR, JK, D, T Flip-Flop.

Unit IV

Input Output Organization: Peripheral devices, I/O Interface, Asynchronous Data Transfer, Modes of Data Transfer, Direct Memory Access, I/O Processor.

Unit V

Memory Organization: Types and capacity of Memory, Memory Hierarchy, Cache Memory, Virtual Memory.

Unit III

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Mode, Data Transfer and Manipulation, Program Control.

Suggested Readings-

1. Computer System Architecture, By M. Morris Mano (Pearson, Prentice Hall)
2. Carter Nicholas, "Computer Architecture", Schaun outline Sevies , Tata McGraw-Hill.
3. J.P. Hayes, "Computer Architecture & Organization", Tata McGraw Hill
4. Digital Computer Electronics By Malvino Leach, Jerald A. Brown(McGraw Hill)

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Semester II

Course Code: BCA4.5DCCT22
Type of the course: Discipline Specific Core Course I of Semester I
Title of the Course: Internet Programming
Level of the Course: NHEQF Level 4.5
Credit of the Course: 4
Delivery sub-type of the course: Theory 3. Tutorial 1
Pre-requisites and requisites of the course: Student enrolled and registered in UG Programme first semester.
Duration of Exam: 3 Hours
Maximum Marks: 150
Internal Exam: 30 Marks
Theory Exam: 80 Marks
Practical Exam: 40 Marks
Objectives of the course: Course Objectives:

1. To gain knowledge of how the client-server model of Internet programming works
2. To learn the design and development of interactive, client-side, executable web applications
3. To acquire the ability to demonstrate how Internet programming tasks are accomplished
4. To know how to build tools that assist in automating data transfer over the Internet.
5. To understand the advantages and disadvantages of the core Internet protocols

Course Learning Outcomes:

After completion of this course, the student will be able to -

1. Explain how the client-server model of Internet programming works
2. Design and develop interactive, client-side, executable web applications
3. Demonstrate how Internet programming tasks are accomplished
4. Build tools that assist in automating data transfer over the Internet
5. Compare the advantages and disadvantages of the core Internet protocols

Course Contents

Unit I

Internet Basics: Evolution of Internet, Basic internet terms and applications. ISP, Anatomy of an e-mail Message, basic of sending and receiving, E-mail Protocol; Mailing List- Subscribing, Unsubscribing.

Unit II

Introduction to World Wide Web and its work, Web Browsers, Search Engine, Downloading, Hyper Text Transfer Protocol (HTTP), URL, Web Servers, FTP, Web publishing- Domain Name Registration, Space on Host Server for Web Site, Maintain and Updating.

Unit III

HTML: Elements of HTML & Syntax, Comments, Headings, Paragraph, Span, Pre Tags, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, div, Use of Forms in Web Pages.

Unit IV

CSS**:** Introduction to Cascading Style Sheets, Types of Style Sheets (Inline, Internal and External), using Id and Classes, CSS properties: Background Properties, Box Model Properties, Margin, Padding, List Properties, Border Properties

Unit V

Java Script: Introduction to Client Side Scripting, Introduction to JavaScript, Comments, Variables in JS, Global Variables, Data types, Operators in JS, Conditions Statements (If, If Else, Switch), Java Script Loops (For Loop, While Loop, Do While Loop), JS Popup Boxes (Alert, Prompt, Confirm), JS Events, JS Arrays, JS Objects.

Suggested Readings:

1. Thomas A. Powell , “HTML: The Complete Reference”, Osborne/McGraw-Hill
2. Deitel, Deitel and Nieto : Internet & WWW. How to program, 2nd Edition, Pearson Education Asia.
3. Bayross, "Web Enabled Commercial Applications Development Using HTML, DHTML, Java Script, Perl CGI," Third Edition, BPB Publications.
4. Internet and Web Page Designing By V.K Jain (BPB)
5. Web Enabled Commercial Application Development Using HTML, DHTML , java script, Perl CGI By Ivan Bayross (BPB)

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Course Code: BCA4.5DCCT23
Type of the course: Discipline Specific Core Course I of Semester I
Title of the Course: DBMS
Level of the Course: NHEQF Level 4.5
Credit of the Course: 4
Delivery sub-type of the course: Theory 3. Tutorial 1
Pre-requisites and requisites of the course: Student enrolled and registered in UG Programme first semester.
Duration of Exam: 3 Hours
Maximum Marks: 150
Internal Exam: 30 Marks
Theory Exam: 80 Marks
Practical Exam: 40 Marks
Objectives of the course: Course Objectives:

1. To understand the need for a DB approach and understand the components and roles of DBMS
2. To know how to write SQL queries for the given problem statement
3. To apply DB system development life cycle to business problems
4. To develop ER diagram for representing the conceptual data model
5. To convert ER diagram into a set of relations representing the logical data model
6. To implement a collection of ties in the chosen DBMS product, such as ORACLE
7. To have a broad understanding of database concepts and database management system software
8. To have a high-level experience of major DBMS components and their function
9. To be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
10. To be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
11. To understand detailed architecture, define objects, load data, query data, and performance-tune SQL databases.
12. To be able to handle large volumes of structured, semi-structured, and unstructured data using database technologies.

Course Learning Outcomes:

After completion of this course, the student will be able to -

1. Appreciate the need for a DB approach and understand the components and roles of DBMS
2. Write SQL queries for the given problem statement
3. Apply DB system development life cycle to business problems
4. Develop ER diagram for representing the conceptual data model
5. Convert ER diagram into a set of relations representing the logical data model
6. Implement a collection of ties in the chosen DBMS product, such as ORACLE
7. Have a broad understanding of database concepts and database management system software
8. have a high-level experience of major DBMS components and their function
9. be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
10. be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
11. To understand detailed architecture, define objects, load data, query data, and performance-tune SQL databases.

Course Contents

Unit I

Introduction: Characteristics of database approach, Advantages, Database system architecture, Overview of different types of Data Models and data independence, Schemas and instances, Database languages and interfaces; E-R Model: Entities, Attributes, keys, Relationships, Roles, Dependencies, E-R Diagram.

Unit II

Introduction to Relational model, Constraints: Domain, Key, Entity integrity, Referential integrity; Keys: Primary, Super, Candidate, Foreign; Relational algebra: select, project, union, intersection, cross product, different types of join operations.

Unit III

SQL: Data Types, statements: select, insert, update, delete, create, alter, drop; views, SQL algebraic operations; Stored procedures: Advantages, Variables, creating and calling procedures, if and case statements, loops, Functions, Triggers.

Unit IV

Normalization: Definition, Functional dependencies and, inference rules, 1NF, 2NF, 3NF; Transactions processing: Definition, desirable properties of transactions, serial and non-serial schedules, the concept of serializability, conflict-serializable schedules.

Unit V

Concurrency Control: Two-phase locking techniques, dealing with Deadlock and starvation, deadlock prevention protocols, basic timestamp ordering algorithm; Overview of database recovery techniques; and the concept of data warehousing.

Suggested Readings:

1. Fundamentals of Database Systems, Ramez A. Elmasri, Shamkant Navathe,5th Ed(Pearson)
2. Database System Concepts By Korth, Silberschatz, Sudarshan (Mcgraw Hill)
3. An Introduction to Database Systems By Bipin C. Desai (Galgotia Publication.)
4. SQL, PL/SQL Programming By Ivan Bayross (BPB)
5. Commercial Application Development Using Oracle Developer 2000 By Ivan Bayross (BPB)

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Course Code: BCA4.5DCCT24
Type of the course: Discipline Specific Core Course I of Semester I
Title of the Course: Mathematics for Computer Science
Level of the Course: NHEQF Level 4.5
Credit of the Course: 6
Delivery sub-type of the course: Theory 5. Tutorial 1
Pre-requisites and requisites of the course: Student enrolled and registered in UG Programme first semester.
Duration of Exam: 3 Hours
Maximum Marks: 150
Internal Exam: 30 Marks
Theory Exam: 120 Marks

Objectives of the course: Course Objectives:

1. To learn to evaluate mathematical arguments revolving around computation
2. To understand the basics of Combinations and Permutations
3. To acquire the ability to represent relations matrices and digraphs
4. To acquire and apply the knowledge on Graphs and Trees to real-world applications
5. To have the ability to Demonstrate the working of Grammars and Languages

Course Learning Outcomes:

After completion of this course, the student will be able to -

1. Comprehend and evaluate mathematical arguments revolving around computation.
2. Understand the basics of Combinations and Permutations.
3. Represent relations matrices and digraphs.
4. Apply the knowledge of Graphs and Trees to real-world applications.
5. Demonstrate the working of grammar and Languages.

Course Contents

Unit-I

Matrices: Basic Definitions, matrix operations- addition, multiplication, transpose, Adjoint and inverse. Determination of a square matrix (up to 3X3 matrix). Eigenvalues and eigenvectors of real symmetric matrices.

Unit-II

Statements (Propositions), Logical Operations, Truth Table, Tautologies, Contradiction, Logical Equivalence, Algebra of Propositions, Conditional and bi-conditional Statement, Argument, Logical Implication, Propositional Functions, Quantifiers, Negation of Quantifier Statements, Normal forms.

Unit-III

Mathematical Induction, Euclid's division algorithm, Congruence modulo: meaning, properties and compatibility with addition, subtraction, multiplication and exponentiation.

Unit-IV

Sets: Definition, empty set, Finite & infinite sets, equal sets, subsets, power sets, universal sets, disjoint sets, complements of a set. various representations, Venn diagrams, Operations: Union, intersection, Set Difference, Cartesian product.

Unit-V

Relations: Definition, Types of relations; Functions: concept, various types and composition. Probability: basics, conditional probability, Bayes theorem, discrete and continuous random variables, Likelihood.

Suggested Readings:

1. Discrete Mathematics and its applications by K.H. Rosen, seventh edition
2. Discrete Mathematical Structures by Kolman, Busby and Ross, Sixth Edition, PHI.
3. Sheldon M Ross, “Introduction to Probability Models”, Academic Press, 2003.
4. Mathematics Volume I By R.D. Sharma (Dhanpat Rai Publication)
5. Mathematics Volume II By R.D. Sharma (Dhanpat Rai Publication)
6. Engineering Mathematics Volume I By S.S. sastry (Prentice-Hall of India)
7. Discrete mathematics Schaum’s Series By Seymour LipSchutz, Marc Lipson (Tata McGraw Hill)
8. Discrete mathematics By Vinay Kumar (BPB)
9. Discrete mathematical Structure By Dr. K.C. Jain, Dr. M.L. Rawat.
10. NCERT Mathematics Textbook for class XI and XII
11. https://www.mathsisfun.com/algebra/eigenvalue.html
12. https://courses.csail.mit.edu/6.042/spring17/mcs.pdf

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Scheme of end-of-semester examination:

The Bachelor in Computer Applications (BCA) is of 6-semester duration full-time program. The program will have core courses, core electives, skill development, and elective open papers, a dissertation/project/training/review/clinical project/internship/case study in the 6th semester, and a combined practical paper based on theory papers in each semester. The dissertation/project/training/review/clinical project/internship/case study will be evaluated by an external examiner.

1. English shall be the medium of instruction and examination.
2. There will be a semester-end examination. The semester-end examinations, evaluation, publication of results, award of marks statements, and award of diplomas shall be undertaken by MGS University, Bikaner.
3. The system of evaluation shall be as follows:
   - 3.1 The evaluation scheme shall comprise external evaluation and internal evaluation. The internal evaluation will carry 20% marks in each course except DECC. Each theory paper will carry 80 marks. The practical paper will carry 40 marks. Any student who fails to participate in classes, viva voce, or practical work will be debarred from appearing in the end-semester examination.
   - 3.2 The duration of the written examination for each paper shall be of three hours and the Practical examination shall be for one-day duration.
   - 3.3 The minimum attendance required by a candidate will be as per the University rules.
4. With regards to the Dissertation/project/training/review/clinical project/internship/case study, the scheme of evaluation shall be as follows:
   - 4.1 The candidate has to submit a report/thesis/dissertation/case study in a spiral/bound form in three copies which would be evaluated by an external examiner. Total marks for Project/case studies/training/dissertation/internship shall be __.
5. Award of degree, grading, scope for improvement/appeal – as per Maharaja Ganga Singh University rules and regulations/ordinances (CBCS/Semester). Pass Criteria
6. For passing in the each theory examination, a candidate is required to obtain 36% marks in all theory papers and 36% marks separately in the practical examination and internal and dissertation.

Pattern of Examination

A course will contain 5 units. The question paper shall contain three sections. Section A (10 marks) shall contain 10 questions two from each Unit. Each question shall be of 1 mark. All the questions are compulsory. The answers should not exceed 50 words. Section B (25 marks) shall contain 5 questions (two from each unit with internal choice). Each question shall be of 5 marks. The candidate is required to answer all 5 questions. The answers should not exceed 200 words. Section C (45 marks) shall contain 5 questions, one from each Unit. Each question shall be of 15 marks. The candidate is required to answer any three questions by selecting these three questions from different units. The answers should not exceed 500 words.

Model Paper for 80 marks Theory Paper

Bachelor of Computer Application

Semester I

Duration: 3 Hours **Maximum Marks: 80**

BCA4.5DCCT12- Computer Fundamentals

Instructions: The question paper shall contain three sections. Section A (10 marks) shall contain 10 questions two from each Unit. Each question shall be of 1 mark. All the questions are compulsory. The answers should not exceed 50 words. Section B (25 marks) shall contain 5 questions (two from each unit with internal choice). Each question shall be of 5 marks. The candidate is required to answer all 5 questions. The answers should not exceed 200 words. Section C (45 marks) shall contain 5 questions, one from each Unit. Each question shall be of 15 marks. The candidate is required to answer any three questions by selecting these three questions from different units. The answers should not exceed 500 words.

Section – A

1. (a) …..…… from unit 1 ……. [1 x 10 =10]

(b) ……from unit 1 ……..

(c) ……from unit 2 ……..

(d) ……from unit 2……...

(e) ……from unit 3……...

(f) ……from unit 3……...

(g) ……from unit 4……..

(h) ……from unit 4……..

(i) ……from unit 5……...

(j) ……from unit 5……...

Section - B

2. ……from unit 1…… [5 x 5=25]

or

3……from unit 1……..

4. ……from unit 2……

or

5……from unit 2……

6……from unit 3……

or

7……from unit 3……

8……from unit 4……

or

9……from unit 4……...

10……from unit 5…….

or

11……from unit 5…….

Part - C

[15 x 3=45]

12. ……from unit 1…….

13. ……from unit 2…….

14……from unit 3……...

15. ……..from unit 4……..

16. ……..from unit 2……..

Model Paper for 120 marks Theory Paper

Bachelor of Computer Application

Semester I

Duration: 3 Hours **Maximum Marks: 120**

BCA4.5DCCT24- Mathematics for Computer Science

Instructions: The question paper shall contain three sections. Section A (20 marks) shall contain 10 questions two from each Unit. Each question shall be of 2 mark. All the questions are compulsory. The answers should not exceed 50 words. Section B (40 marks) shall contain 5 questions (two from each unit with internal choice). Each question shall be of 8 marks. The candidate is required to answer all 5 questions. The answers should not exceed 200 words. Section C (60 marks) shall contain 5 questions, one from each Unit. Each question shall be of 20 marks. The candidate is required to answer any three questions by selecting these three questions from different units. The answers should not exceed 500 words.

Section – A

1. **(a) ……..…… from unit 1 ……** **[2 x 10 =20]**

(b) ……from unit 1 ……..

(c) ……from unit 2 ……..

(d) ……from unit 2……

(e) ……from unit 3……

(f) ……from unit 3……..

(g) ……from unit 4……

(h) ……from unit 4……

(i) ……from unit 5……

(j) ……from unit 5……

Section - B

2. ……from unit 1…… [8 x 5=40]

or

3……from unit 1……

4. ……from unit 2…….

or

5……from unit 2…….

6……from unit 3……

or

7……from unit 3…….

8……from unit 4……

or

9……from unit 4…….

10……from unit 5…….

or

11……from unit 5……...

Part - C

[20 x 3=60]

12. ……from unit 1…….

13. ……from unit 2…….

14……from unit 3…….

15. ……..from unit 4……..

16. ……..from unit 5…….