MAHARSHI DAYANAND SARASWATI UNIVERSITY,
AJMER

पाठ्यक्रम

SYLLABUS

SCHEME OF EXAMINATION AND
COURSES OF STUDY

FACULTY OF SCIENCE

B.Sc. Computer Science

I Year Examination
(w.e.f. 2019-20)
II Year Examination
(w.e.f. 2020-21)
III Year Examination
(w.e.f. 2021-22)

ALKA PUBLICATIONS
Purani Mandi, Ajmer

NOTICE

1. Change in Statutes/Ordinances/Rules/ Regulations Syllabus and Books may, from time to time, be made by amendment or remaking, and a candidate shall, except in so far as the University determines otherwise comply with any change that applies to years he has not completed at the time of change. **The decision taken by the Academic Council shall be final.**

सूचना

1. समय-समय पर संशोधन या पुन: निर्माण कर परिनियमों/ अध्यादेशों/नियमों / विनियमों / पाठ्यक्रमों व पुस्तकों में परिवर्तन किया जा सकता है, तथा किसी भी परिवर्तन को छात्र को मानना होगा बशर्ते कि विश्वविद्यालय ने अन्यथा प्रकार से उनको छूट न दी हो और छात्र ने उस परिवर्तन के पूर्व वर्ष पाठ्यक्रम को पूरा न किया हो। **विद्या परिषद द्वारा लिये गये निर्णय अन्तिम होंगे।**

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TEACHINGAND EXAMINATION SCHEME
B. Sc. Computer Science - I Year

Paper Name (Theory)		Lec	Exam Hours	Marks Min	Marks Max
bcs-101	Computer Programming Fundamental	3	3	18	50
bcs-102	Digital Logic	3	3	18	50
bcs-103	Electronics	3	3	18	50
bcs-104	Data Structure	3	3	18	50
bcs-105	Relational Database Management Systems	3	3	18	50
bcs-106	Data Communications	3	3	18	50
	Total of Theory Marks				**300**

Paper Name (Practical)		Pract Hours	Exam Hours	MARKS Min	MARKS Max
bcs-107	Digital Electronics Lab	3	3	18	50
bcs-108	RDBMS Lab	3	3	18	50
bcs-109	Programming Data Structure Lab	3	3	18	50
	Total of Practical Marks				**150**
	Total of Theory & Practical Marks				**450**

B. Sc. (Computer Science)
Scheme of Examination

Theory:

Part A:

1. 10 Question of 1.5 mark each – 15 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part B:

1. 5 Questions of 3 marks each – 15 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part C:

1. 3 Questions of 7+7+6 marks each – 20 marks.
2. There will be an internal choice in each question.
3. Answer should not exceed 400 words

Practical & Projects:

Practical exams shall be conducted by one internal and one external examiner of a batch of 40 students in a day.

Duration of Practical exam is 3 hours.

A Laboratory Exercise File should be prepared by each student for each practical paper and should be submitted during practical examinations.

Practical of 50 marks distribution is as under:

a. 30 marks for practical examination exercise for 3 questions

b. 10 marks for Viva-voce
c. 10 marks for Laboratory Exercise File

The number of paper and the maximum marks for each paper are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper, wherever prescribed, separately.

Classification of successful candidates shall be as follows:

First Division 60% } of the aggregate marks prescribed at (a) Part I
Second Division 48% } Examination, (b) Part II Examination,
(c) Part III Examination, taken together

All the rest shall be declared to have passed the examination, if they obtain the minimum pass marks in each subject viz. 36% no division shall be awarded at the Part I and Part II examination.

Note:

Eligibility for admission in First year of B. Sc. (CS) is 10+2 with Science examination of any board with at least 50% marks. As regards admission on reserved category seats government rules will be applicable.

Duration: 3 hours **Max Marks: 50**

bcs-101 Computer Programming Fundamental

C Programming Practical Laboratory

Different data types and sizes, variable names, constants, Declaration, Type conversion,

Arithmetic, operations, Relation and Logical operators, Increment and Decrement operators, Bitwise and Logical operators, Assignment operators and Expressions, Precedence and order of Evaluation.

Statement and Blocks, if-else, else, switch, while, for, do-while loops, break, continue, go to and labels, function and Program structures, function structures, Function Arguments, External, Static, Register variables, Scope rules, structure, initialization, Recursion.

Pointer and Addresses, Pointers and Function arguments, Pointer and Arrays, address arithmetic, character Pointers and functions, Multidimensional Arrays Pointer arrays, Pointers to Pointers, Initialization of pointer arrays, pointers v/s Multidimensional arrays, command line arguments, Pointer to functions.

Structure and function, Arrays of structures Pointers to Structures, Self- Referential structures, Table lookup, Fields, Union, Typedef.

Standard input and Output Formatting input & output, in memory format conversion, File access, Error Handling, Line I/O.

Duration: 3 hours **Max Marks: 50**

bcs-102 Digital Logic

Representation of Information: Numeric and Nonnumeric, Number Integer and Real Binary, Octal, Hexadecimal, Positive and Negative Numbers Arithmetic in Number systems. Ten's complements, 1's and 2's complements, Binary multiplication and Division. characters: ASCII and EBCDC codes, Error detection and Correction Codes: concept. Minimum Distance 3code,

Hamming Code.

Basic Logic Design; Logic Gates; AND, OR, Not, BNOR, NAND,EXOR, Introduction to ITL Gates, Truth Table, Boolean , Algebra: Boolean Relational, Sums, Algebraic, Simplification and Minimization of Boolean Full Adder, Decoder, Demultiplexer Encoder, Multiplexers.

Sequential Logic Circuit: Flip-flop: RS Clocked, D, JK, Master Salve Flip flop, Shift register, Shift Left, Shift Right, Bidirectional Shift, Counter: Ripple, Synchronous, RingUp, Down, Memory, type of memory, RAM, Rom, and their Specifications, Secondary Memory Device: Tape, Dist, Floppy, drum, Optical, CD ROM, Magnetic Bubble Memory and charge coupled Devices.

ALU, Register Unit, Control and Timing unit, System Bus, Address bus, Data Bus, Control Bus and utility lines, Accumulator, Generals purpose registers, Special purpose register program counter (PCP, stack Pointer (SP) Status register, Instruction register, index register, memory Address register (MAR) and Memory Buffer Register (MBR).

Input devises: Keyboard, Mouse, Light pen, Joystick, Trackball, Scanner, Voice Input System Output devices: CRT, Printer, Dot matrix, Letter quality, Nonimpack, Inkjet, Laser, Line and Page printers, plotter, Microfilm and microfiche, voice output system. IO Architecture: properties of simple 10 devices and their controller. Transfer of information between I/O device, CPU and Memory, Program controlled and interrupts controlled information transfer.

Duration: 3 hours **Max Marks: 50**

bcs-103 Electronics

Passive component: Resistors: Symbol, types: carbon, metal filament, wire wound, thin film, Fixed and variable, potentiometers and presets, log and linear type specifications, color code, testing of resistors area of applications problems related to joule heating tolerance temperature coefficient applications in potential dividers coazrse AND FINE PRESETS ETC. Inductors Symbol, type air core iron core, ferrite core frequency response of an inductor specifications measurement of inductance choke AF and RF, their uses and area of applications nagaoka formula for fabrication a single layer coil inductance multi-layer coil formula Problems related to a. C. impedance angle between current and voltages power factor. Transformers Principle types (single phase) auto and main transformers Design of mains and step down transformers Simple Idea of AF, IF, RF driver transformers.

Basics of Semiconductors and p-n junction: Conductor, Semiconductors and Insulators, their classification on the basis of Band theory. Intrinsic and extrinsic semiconductors, Fermi level in semiconductors N type and Ptype , current in semiconductors, drift and diffusion-N junction forward and reverse of diode , concept of recombination of carriers temperature variation of forward current and reverse current through the p-n junction. The Rectifier equation, the temperature coefficients, dynamic and junction, the Rectifier equation, the temperature coefficients, dynamic and static resistances, voltage dependent junction capacitance of a p-n junction.

Capacitors: Symbol, code, types: mica, paper, ceramic tantalum poly styrene their construction, working and uses, specifications, testing of condenser, area of applications, problems related to electrical en energy stored design of capacitors phase lag resonance in series and parallel to inductor, leakage effects Relays their types Microphones Loudspeakers their types combinations specifications testing and uses in various field problems and exercises related to lout speakers outputs relay currents phase lag maximum switching rates etc.

A.C. Circuits: A.C. current and voltages. RMS and mean value, operator LR, CR, LCR Circuits series and parallel resonance circuits, factor band with coupling circuits coefficients of coupling choke coils, problems and numerical related to power factor, phase relationship between land through band across L at different frequency B, W and Q calculations, variation of I, V and as a function of frequency.

Circuit Theory: Thevenin'sNorten's and Millman's theorems maximum power transfer theorem, reciprocity theorem, problem related to theorems idea of clipper and voltage doubler.

Single stage RC couple amplifier, frequency response class A, class B, class AB, class C, push-pull amplifier, efficiency of class A, B, AB and C amplifier. Applications of these input V/S output waveform analysis in this amplifier, related problems cascading of the amplifier.

Introduction to Silicon Controller Rectifier (SCR) SCR characteristics and ratings, SCR construction and terminal identification's application, Silicon controlled switch, gate turn off, light activated SCR, shockely diode, DIAC, TRIAC, injunction transistor, its construction and characteristics, symbol and its uses as relaxation oscillator

Duration: 3 hours **Max Marks: 50**

bcs-104 Data Structure

Definitions of Data Structure and Algorithm – Time and Space complexity-Algorithm notations.

Brute force and greedy algorithms, Divide and Conquer Strategy: Merge sort, quick sort, integer multiplication, matrix multiplication, exponentiation problem, convex hull problem, dynamic programming

Complexity theory: Decidability of problems: Halting problem, NP-class of problem, P class of problem, NP=P question, Polynomial reduction problem, Cook's theorem, NP hardness and NP completeness.

Control structures- Variables – Data types- Arrays- String processing – Sorting and Searching- Insertion-Selection-Merge- Radix-Binary Search- Linear Search-Hashing

Binary tree- Representation – Traversing – Threaded Binary tree- Binary Search tree- Insertion deletion into a binary search tree- Heap sort

Graph- Representation of Graph- Shortest path – Operation on Graphs- Traversing a Graph- Topological Sorting – Files

Duration: 3 hours **Max Marks: 50**

bcs-105Relational Database Management System

Object of database systems, data abstraction, data definition language, data manipulation language, database administrator database model, database system architecture. Entity relationship model, entities and entity sets their relationship, mapping constraints, generalization, aggregation, use of ER model for the design of databases, sequential, random, index sequential file organization, relational algebra, normalization up to DKNF. Object Oriented modeling, class, different types of attributes, generalization, inheritance, aggregation, encapsulation, distributed database design, architecture of distributed processing system, data communication concept, data placement, placement of DDBMS, and other components, concurrency control techniques, recovery, transaction management, need of recovery, recovery techniques, serializability, two-phase locking.

Query optimization and processing, algorithm for external sorting, select and join, object and set operations, heuristics in query optimization, temporal database concept, multi-media database, data-mining, association rule, classification, application, data-warehousing, need, architecture, characteristics, data layer, XML tree data model, document, DTD schema, query, database, data-warehousing verses view

Security and integrity of databases, security specifications in SQL, access control, flow control, encryption of public key infrastructure, cryptography and types.SQL*PLUS Data types, Constraints, Operators, DDL, DML, PL/SQL syntax, Data types, PL/SQL functions, Error handling in PL/SQL, package functions, package procedures, Oracle transactions. Stored procedures & functions, creation and execution of procedures, triggers

Duration: 3 hours **Max Marks: 50**

bcs-106Data Communications

Introduction to Data communications and networking, protocols, standards and architecture, topology, transmission mode, OSI model, analog and digital signals, periodic and aperiodic signals, time and frequency domain, Fourier analysis concept.

Encoding digital to digital conversion, analog to digital conversion, digital to analog conversion, analog to analog conversion, transmission of digital data, DTE-DCE interface, EIA-232, EIA-449, X.21, modem, cable modem, guided and unguided, transmission media

Multiplexing, TDM, FDM, WDM, DSL, HDLC, error classification, types of errors, error detection, error correction, virtual redundancy check, longitudinal redundancy check, cyclic redundancy check.

Asynchronous transfer mode, protocol architecture, ATM cells, ATM layers, switches, circuit switching network and concepts, routing, packet switching, X.25, virtual circuit approach, point-to-point layers, link control protocol, network control protocol.

TEACHING AND EXAMINATION SCHEME
B. Sc. Computer Science - II Year

	Paper Name (Theory)	Lec	Exam Hours	Marks Min	Marks Max
bcs-201	Computer Oriented Numerical Methods	3	3	18	50
bcs-202	Object Oriented Programming in C++	3	3	18	50
bcs-203	Computer Organization	3	3	18	50
bcs-204	Computer Networks	3	3	18	50
bcs-205	Operating Systems	3	3	18	50
bcs-206	Microprocessor and Assembly Language Programming	3	3	18	50
	Total of Theory Marks				**300**

	Paper Name (Practical)	Pract Hours	Exam Hours	MARKS Min	MARKS Max
bcs-207	Operating System Lab	3	3	18	50
bcs-208	Electornics Practical Lab	3	3	18	50
bcs-209	C++ Programming & Data Structures	3	3	18	50
	Total of Practical Marks				**150**
	Total of Theory & Practical Marks				**450**

B. Sc. (Computer Science)
Scheme of Examination

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2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part B:

1. 5 Questions of 3 marks each – 15 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part C:

1. 3 Questions of 7+7+6 marks each – 20 marks.
2. There will be an internal choice in each question.
3. Answer should not exceed 400 words

Practical & Projects:

Practical exams shall be conducted by one internal and one external examiner of a batch of 40 students in a day.

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a. 30 marks for practical examination exercise for 3 questions
b. 10 marks for Viva-voce
c. 10 marks for Laboratory Exercise File

The number of paper and the maximum marks for each paper are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper, wherever prescribed, separately.

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First Division 60% } of the aggregate marks prescribed at (a) Part I
Second Division 48% } Examination, (b) Part II Examination, (c) Part III Examination, taken together

All the rest shall be declared to have passed the examination, if they obtain the minimum pass marks in each subject viz. 36% no division shall be awarded at the Part I and Part II examination.

Note:

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Duration: 3 hours **Max Marks: 50**

bcs-201 Computer Oriented Numerical Methods

Characteristics of Numerical Computation, Approximation, Significant Digit, Errors, Introduction to Matrix, Types of Matrix, Square, Row, Column, Diagonal, Unit, Null, Upper Triangular, Lower Triangular, Symmetric, Skew Symmetric, operation of matrix, trace, transpose, addition, subtraction, multiplication, determinant, inverse, Introduction to Linear Equations,

Bisection method, method of successive approximation, method of false position, Newton's iteration method, Newton Raphson method, Horner's method

Gauss Jordan method, Gauss Elimination method, Iterative methods, Jacobi method of iteration, Gauss Seidel Iteration method

Gregory Newton Forward and Backward interpolation Formula, Gauss Forward and backward difference interpolation formula, interpolation with unequal intervals.

Duration: 3 hours **Max Marks: 50**

bcs-202 Object Oriented Programming in C++

Object Oriented Concepts, Tokens, Expressions and Control Structures Introduction: Basic Elements of Programming, Console I/O Operations.

Control Structures: Control and Looping Statements. Function: Function Prototyping, Call and Return by Reference, Inline Function, Default and Const Arguments, Function Overloading, Arrays, Manipulators and Enumeration.

Classes and Object, Object Oriented Methodology: Basic Concepts/ Characteristics of OOP. Advantages and Application of OOP's, Procedural Programming Vs OOP

Classes and Objects: Specifying a Class, Creating Objects, Private & Public

Data Members and Member Functions, Defining Inline Member Functions, Static Data Members and Member Functions. Arrays within Class, Arrays of Objects, Objects as Function Arguments, Returning Objects
Constructors, Destructors, Operators Overloading and Inheritance, Constructors and Destructors: Introduction, Parameterized Constructors, Multiple Constructors in A Class, Constructors With Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors, Const Objects, Destructors Operators Overloading: Definition, Unary and Binary Overloading, Rules for Operator Overloading.
Inheritance: Defining Derived Classes, Types of Inheritance, Constructors and Destructors in Derived Classes.
Pointers Virtual & Friend functions and file handling Pointers: Pointer to Objects, this Pointer, New and Delete Operators, Virtual Function, Friend Functions. Opening, Closing a File, File Modes, File Pointers and their Manipulation, Sequential Input and Output Operations: Updating a File, Random Access, and Error Handling During File Operations, Command Line Arguments.

Duration: 3 hours **Max Marks: 50**

bcs-203Computer Organization

Evolution of computer system, current trend in computing. Von Reumann stored programmed concept, functional components of computer with the case study of casting computing facilities.
Architectural classification schemes like SISD, SIMD, MISD, MIND models, memory and input output subsystems like I/O Channels and peripherals processors.
Instruction formats and addressing modes - direct, indirect, register indirect, relative and indexed, Microprogramming concepts.
Hierarchical memory structures and concept of virtual memory, characteristics of cache memories, operations design aspects and cache bandwidths. Interrupt mechanism and interrupt controllers.
An Introductory overview of architecture of 8088 microprocessor, Instruction set and timing cycles of 8088, machine language program development.

Duration: 3 hours **Max Marks: 50**

bcs-204Computer Networks

Introduction to wireless technologies: WAP services, Serial and Parallel Communication, Asynchronous and synchronous Communication, FDM,TDM, TFM, Spread spectrum technology Introduction to Bluetooth: Specification, Core protocols, Cable replacement protocol
Bluetooth Radio: Type of Antenna, Antenna Parameters, Frequency hopingBluetooth Networking: Wireless networking, wireless network types, devices roles and states, adhoc network, scatternet Connection establishment procedure, notable aspects of connection establishment, Mode of connection, Bluetooth security, Security architecture, Security level of services, Profile and usage model: Generic access profile (GAP), SDA, Serial port profile, Secondary

Bluetooth profile
Hardware: Bluetooth Implementation, Baseband overview, packet format, Transmission buffers, Protocol Implementation: Link Manager Protocol, Logical Link Control Adaptation Protocol, Host control Interface, Protocol Interaction with layers

Duration: 3 hours **Max Marks: 50**

bcs-205Operating Systems

Introduction to Operating Systems, goals of OS, operation of OS, resource allocater and related functions, classes of OS, batch processing, multi-processing, time sharing, distributed, real time systems, system calls, system programs, structure of OS, layer design of DOS, Unix, virtual machine OS, kernel based OS, micro-kernel based OS, architecture of Window 2000.
Process concept, interacting process, threads, fundamental of scheduling, scheduling criteria, long medium short term scheduling, scheduling algorithms , structure of concurrent system, critical section, critical region, inter-process communication, monitor and semaphores, implementation and uses.
Logical versus physical address, swapping, contiguous allocation, segmentation, paging, segmentation with paging, kernel memory allocation, page replacement algorithm, virtual memory, virtual memory with paging, demand paging, dead lock, characterization, methods for handling dead locks, prevention, avoidance, thrashing, allocation of frame, virtual memory using segmentation,
Architecture of Distributed system, inter-process communication protocol, network OS, issues in distributed design, issues of distributed file system, network structure, distributed system structure, file system, coordination.
History of Linux, Linux architecture, Linux file System, file naming, types of files, directory command, file command, vi editor, locating files in Linux, filter pipe, shell variables, local and global variables, command substitution, if, while, for, shift, tar, basic networking commands in Linux.

Duration: 3 hours **Max Marks: 50**

bcs-206Microprocessors and Assembly Language Programming

Introduction to microprocessor Basic features of 8085 microprocessors and its addressing modes, 8085 microprocessor architecture
Memory and I/O interfacing Address decoding, Address aliasing, Memory read and write operations, Timing diagrams, Memory mapped I/O and I/O mapped I/O Programming of 8085 Instruction Set, Assembly Language Programming and Illustrative examples 8085 Interrupt Structure
Data Transfer Techniques Synchronous and Asynchronous modes of data transfer, Interrupt driven I/O,
DMA Peripheral Devices 8255 programmable peripheral interface, 8254 programmable counter, 8251 UART programmable communication interface, 8257 DMA Controller. 8259 Interrupt controller, 8279 Keyboard & display interface. Signal converter and their interfacing techniques- ADC 0809, DAC 0808.
Introduction to micro-controller 8051 as an example. Micro-controller

architecture, bi-directional data ports, internal ROM and RAM, counters/timer s. oscillator and clock, serial communication. 8051-register set, memory organization – internal & external, program memory & data memory, bit addressable memory, and special function registers Introduction to instruction set of 8051 and assembly language programming

Introduction to advanced microprocessors 8086 as an example, 8086Architecture and Internal Resister Set, Brief discussion on Instruction Set, Min-Max mode, Concept of Co-processor and its interfacing, Brief studies on Important features of higher processor in the Intel 80X86 family.

TEACHINGAND EXAMINATION SCHEME

B. Sc. Computer Science - III Year

Paper Name (Theory)		Lec	Exam Hours	Marks Min	Marks Max
bcs-301	Java Programming	3	3	18	50
bcs-302	Discrete Mathematics	3	3	18	50
bcs-303	Software Engineering & Project Management	3	3	18	50
bcs-304	Web Technologies	3	3	18	50
bcs-305	Digital Design Using VHDL	3	3	18	50
bcs-306	Internet of Things	3	3	18	50
	Total of Theory Marks				**300**

Paper Name (Practical)		Pract Hours	Exam Hours	MARKS Min	MARKS Max
bcs-307	Java Programming Lab	3	3	18	50
bcs-308	Electronics Practical Lab	3	3	18	50
bcs-309	Digital Design Using VHDL Lab	3	3	18	50
bcs-310	Project	6	3	18	50
	Total of Practical Marks				**200**
	Total of Theory & Practical Marks				**500**

B. Sc. (Computer Science)
Scheme of Examination

Theory:

Part A:

1. 10 Question of 1.5 mark each – 15 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part B:

1. 5 Questions of 3 marks each – 15 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part C:

1. 3 Questions of 7+7+6 marks each – 20 marks.

2. There will be an internal choice in each question.
3. Answer should not exceed 400 words

Practical & Projects:

Practical exams shall be conducted by one internal and one external examiner of a batch of 40 students in a day.

Duration of Practical exam is 3 hours.

A Laboratory Exercise File should be prepared by each student for each practical paper and should be submitted during practical examinations.

Practical of 50 marks distribution is as under:

a. 30 marks for practical examination exercise for 3 questions
b. 10 marks for Viva-voce
c. 10 marks for Laboratory Exercise File

The number of paper and the maximum marks for each paper are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as the practical part of a subject/paper, wherever prescribed, separately.

Classification of successful candidates shall be as follows:

First Division 60% } of the aggregate marks prescribed at (a) Part I Examination, (b) Part II Examination,
Second Division 48% } (c) Part III Examination, taken together

All the rest shall be declared to have passed the examination, if they obtain the minimum pass marks in each subject viz. 36% no division shall be awarded at the Part I and Part II examination.

Note: Eligibility for admission in First year of B. Sc. (CS) is 10+2 with Science examination of any board with at least 50% marks. As regards admission on reserved category seats government rules will be applicable.

Duration: 3 hours **Max Marks: 50**

bcs-301Java Programming

Introduction to Java, history, characteristics, Object Oriented Programming, data types, variables, arrays, difference between Java and C++

Control statements: Selection, iteration, jump statements, operators

Introduction to classes, class fundamentals, constructor, methods, stack class, inheritance, creating multilevel hierarchy, method over riding

Packages and interfaces, exception handling, multi-threaded programming, I/O applets

Java Library, string handling, string comparison, string buffer, utility classes, vector stack dictionary, applet class, introduction to AWT, working with frame windows.

Java Beans, beans architecture, AWT components, advantage of Java Beans, beans serialization, JDBC, class and methods, API components, JDBC components, driver, connectivity to database processing result and interfaces, RMI, comparison of distributed and non-distributed Java programs, interfaces, RMI architecture layer, ODBC, CORBA, CORBA services and products, CGI, structure of CGI.

Duration: 3 hours **Max Marks: 50**

bcs-302Discrete Mathematics

Groups & Rings: Introduction to semi-groups, monoiods, groups,,generators, cosets,normal subgroups, Langrange's Theorem, homomorphism, rings, polynomial rings, andfields.

Lattices: Introduction to partial orders, semi-lattices, and lattices.

Vector spaces: vector spaces, linear combinations, convex sets, linear independence,dimension, the column rank and row rank of a matrix.

Linear Mappings: linear mappings and vector space of linear maps, the kernel and theimage of a linear map, orthogonal complement of a subspace, the vector space ofhomogeneous system of linear equations, set of solutions of a non-homogeneous systemof linear equations, matrix associated with a linear map, change of bases, composition oflinear maps, inverse of a linear map.

Scalar products on vector spaces, norm, Schwartz's inequality, Bessel's inequality,orthogonal bases, bilinear maps and matrices, determinants, the rank of a matrix and sub-determinant,Cramer's rule, determinants as areas and volumes, Eigen vectors and Eigenvalues, Eigen space, The characteristic polynomial, Eigen values and Eigen vectors of asymmetric matrix, diagonalisation of a symmetric linear map

Classification of conic sections and quadric surfaces

Duration: 3 hours **Max Marks: 50**

bcs-303Software Engineering & Project Management

Concepts of Software Engineering, Software Characteristics, components applications, software Metrics and Models; Process and Product Metrics, Size metric, Complexity metric, McCabe's Cyclometic Complexity, Halsted Theory, Function Point Analysis.

System Development Life Cycle (SDLC) Steps, Water fall model, Prototypes, Spiral model. Planning and Software Project: Cost Estimation, Project Scheduling, Quality Assurance Plans, project Monitoring Plans.

Software Development & Software Design : System design, detailed design, function oriented design, object oriented design user Interface design, Design level metrics: Phases, Process Models, Role of Management, Role of Metrics and Measurement, Software Quality factors,

Coding and Testing: Programming Practices, verification, Monitoring and Control. Testing level metrics Software quality and reliability Clean room approach, software reengineering.

Testing & Reliability: Testing Fundamentals, Test case design, Functional Testing, Structural Testing, Test Plan activities during testing, Unit System , Integration Testing. Concept of Software Reliability, Software Repair and Availability, Software Errors and Faults Reliability Models (JM, GO, MUSA Markov) Limitations of Reliability Models

Duration: 3 hours **Max Marks: 50**

bcs-304 Web Technologies

Internet – current state, hardware and software requirement, ISP, an internet account, web home page, URL, browser, security on web, searching tools, search engines, FTP, Gopher, Telnet, emails, TFTP

Web browser architecture, web page and multimedia, static dynamic and active web page, simple mail transfer protocol, simple network management protocol, hypertext transfer protocol

Basics of PHP: Introduction to PHP, what does PHP do? ,history of PHP , language basics ,data types , variables , expressions and operators , flow control statements, including code, embedding PHP in web pages.

Functions & Strings: Calling a function, defining a function, variable scope, function parameters, return values, variable functions, anonymous functions. Strings: Accessing individual characters, cleaning strings, encoding and escaping, comparing strings, manipulating and searching strings, regular expressions.

Arrays & Objects: Indexed vs. associative arrays, identifying elements of an array, storing data in arrays, multidimensional arrays, extracting multiple values, converting between arrays and variables, traversing arrays, sorting. Objects: Creating an object, accessing properties and methods, declaring a class, introspection.

MySQL Overview: Introduction, connecting to and disconnecting from the server , Entering queries , Creating and using a database , Creating and selecting a database , creating a table , loading data into a table , Retrieving information from a table , selecting all data , selecting particular rows , selecting particular columns , sorting rows , date calculations , working with NULL values , pattern matching , counting rows , using more than one tables.

MySQL databases in PHP: Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data, deleting data.

JavaScript - JavaScript Introduction , Variable, If-Else, Switch, Operators, Popups, Functions,Iterator functions, Loops, Forms, Events, and Event Handling, Try-Catch, Introduction to JavaScript Objects, JS Built-in Objects:Array,String , Date , window, document, navigator, status, history, location. Event handling, DOM, dynamically adding, removing and replacing DOM

Duration: 3 hours **Max Marks: 50**

bcs-305Digital Design Using VHDL

Introduction & Behavioural Modelling

Introduction to HDLs: Difference between HDL and other software languages – Different HDLs in vogue. Overview of digital system design using HDL

Basic VHDL Language Elements: Identifiers, Data objects, scalar and composite data types, Operators

Behavioural Modelling with examples: Entity declaration, Architecture body, Process statement and sequential statements. Inertial and transport delay models, creating signal waveforms, signal drivers, effect of transport and inertial delays on signal drivers.

Data Flow and Structural Modelling

Data Flow Modelling with examples: Concurrent signal assignment statement, Concurrent versus sequential signal assignment, Delta delays, Multiple drivers, Conditional signal assignment statement, selected signal assignment statement,

concurrent assertion statement.
Structural Modelling with examples: Component declaration, Component instantiation and examples, direct instantiation of component.
Subprograms and Packages
Subprograms and Overloading: Functions and procedures with simple examples –subprogram overloading, Operator overloading.
Packages and Libraries: Package declaration, package body, design file, design libraries,
order of analysis, implicit visibility, explicit visibility, library clause and use clause.
Advanced Features: Entity statements, Generate statements, Attributes, Aggregate targets, ports and their behaviour.
Simulation and Hardware modelling
Model Simulation: Simulation – Writing a Test Bench for a Half and a Full adder.
Hardware Modelling Examples: Modelling entity interfaces, Modelling simple elements,
Different styles of modelling, Modelling regular structures, Modelling delays, Modelling
conditional operations, Modelling a clock divider and a pulse counter.

Duration: 3 hours **Max Marks: 50**

bcs-306Internet of Things

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management
IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.
IOT Data Link Layer & Network Layer Protocols PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART,Z-Wave,Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP
Transport & Session Layer Protocols, Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS)–Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT
Service Layer Protocols & Security, Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer

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