TEACHING AND EXAMINATION SCHEME FOR
Vocational Computer Applications II Year

Paper Name (Theory)	Lec.	Exam Hours	Marks of B. Sc.	
VCA-03 Discrete Mathematics	3	3	75	27
VCA-04 Java Programming	3	3	75	27
Paper Name (Practicals)				
VCA-LAB-02 Java Programming	3	3	75	27

Note:
The question paper for Vocational Computer Applications (B. Sc.) will be divided into 3 parts

Part A:
1. 10 Question of 1 mark each – 10 marks
2. Answer should not exceed more than 20 words
3. All questions are compulsory

Part B:
1. 5 Questions of 4 marks each – 20 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part C:
1. 3 Questions of 15 marks each – 45 marks. There will be an internal choice in each question.
2. Answer should not exceed 400 words
3. All questions are compulsory.

Practical exam to be conducted by one internal and one external examiner.
Duration of Practical exam is 3 hours.

Duration: 3 hours *Max marks:*
B. Sc. – 75

VCA-03 Discrete Mathematics

Sets: definition and types, set operations, partition of set, cardinality, recursive definition of set. Functions: concept, some special functions (polynomial, exponential & Logarithmic, absolute value, floor & ceiling, mod & div functions) properties of functions, cardinality of infinite set, countable and uncountable set, pigeon hole principle, composition of function

Relations: Boolean matrices, binary relation, adjacency matrix of relation, properties of relations, operations of relations, connectivity relation, transitive closure, Warshall Algorithm, equivalence relation, equivalence class

Proof Methods: Vacuous, trivial, direct, indirect by contrapositive and contradiction, constructive & non-constructive proof, counterexample. The division algorithm, divisibility properties (prime numbers & composite numbers) principle of mathematical induction, the second principle of mathematical induction, fundamental theorem of arithmetic. Algorithm correctness: partial correctness, loop invariant, testing the partial correctness of linear and binary search, bubble and selection sorting

Graph theory: Graphs, directed, undirected, simple, adjacency & incidence, degree of vertex, sub-graph, complete graph, cycle & wheel graph, bipartite & complete bipartite graph, weighed graph, union of simple graphs. Complete graph isomorphic graphs, path, cycles & circuits Euclerian & Hamiltonian graphs. Trees: spanning trees – Kruskal's Algo, finding spanning tree using depth first search, breadth first search, complexity of graph, minimum spanning tree.

Language of Logic: Proposition, compound proposition, conjunction, disjunction, implications, converse, invers and contrapositive, bi-conditional statements, tautology, contradiction, contingency, logical equivalence, quantifiers, arguments.

Duration: 3 hours *Max marks: B. Sc. – 75*

VCA-04 Java 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

Classes and Methods: Introducing classes, Class fundamentals, Declaring Objects, Assigning object reference variables. Introducing method , Constructors, The this Keyword, Garbage Collection- Finalize() method, Overloading methods, Using objects as parameters, Argument Passing , Returning Objects, Recursion , static and final keyword , Nested and Inner Classes , String Class ,Command Line arguments.

Inheritance, Packages, Interfaces: Inheritance Basics , using super, method overriding, Dynamic method dispatch , abstract classes , Using final with inheritance , Packages, Access Protection, Importing packages ,Interfaces.

Exception Handling, Multithreading, Applet : Exception handling fundamentals, Types, Using try, catch, throw, throws and finally , Java thread model , Creating a Thread , Creating multiple threads, Thread priorities , synchronization , Inter-thread communication , Applet Basics , Applet Skeleton, HTML applet tag – Passing parameters to applet

I/O Streams, Utility Classes: I/O Streams- Byte Streams , Character Streams, Reading and Writing Files, Legacy Classes and Interface: Vector, Stack, The Enumeration Interface, Utility classes: StringTokenizer, Date, Calendar, Random, Scanner

Javax.Swing Package : JButton , JLabel,JTextField , JPasswordField, JRadioButton, JCheckBox, JComboBox , JList, JToggleButton, JSpinner, JTabbedPane, JTable, JToolBar , JToolTip , JFrame , JPanel , JDialog , JSlider, Introduction to Event Handling: Event Classes – Event Listener interfacess