Nadindas Khandwala College

Revised Syllabus
And
Question Paper Pattern
Of Course
Of
Bachelor of Computer Science (BSC CS)
Programme

Department Of CS
First Year
Semester II

Under Autonomy

(To be implemented from Academic Year- 2017-2018)

Bachelor of Computer Science (BSC CS) Program

Under Choice Based Credit, Grading and Semester System

Course Structure

FYBSC CS

(To be implemented from Academic Year- 2017-2018)

FYBSC CS – SEMESTER II							
Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1721UCSPC	**Core 6:** Programming with C	3	2 1/2 Hours	25	75	100	2
1722UCSPP	**Core 7:** Programming with Python	3	2 1/2 Hours	25	75	100	2
1723UCSLX	**Core 8:** Linux	3	2 1/2 Hours	25	75	100	2
1724UCSDS	**Core 9:** Data Structures	3	2 1/2 Hours	25	75	100	2
1725UCSCC	**Core 10:** Calculus for Computer Science	3	2 1/2 Hours	25	75	100	2
1726UCSGC	**Core 11:** Green Computing	3	2 1/2 Hours	25	75	100	2
1627UCSSM	**DSE Allied 1 :** Statistical Methods and Testing of Hypothesis	3	2 1/2 Hours	25	75	100	2

1721UCSPR	**Core 6 Practical:** Programming with C	**2**	**2 Hours**	**-**	**50**	**50**	**1**
1722UCSPR	**Core 7 Practical:** Programming with Python	**2**	**2 Hours**	**-**	**50**	**50**	**1**
1723UCSPR	**Core 8 Practical:** Linux	**2**	**2 Hours**	**-**	**50**	**50**	**1**
1724UCSPR	**Core 9 Practical:** Data Structures	**2**	**2 Hours**	**-**	**50**	**50**	**1**
1725UCSPR	**Core 10 Practical:** Calculus for Computer Science	**2**	**2 Hours**	**-**	**50**	**50**	**1**
1726UCSPR	**DSE Allied 2 Practical:** Statistical Methods and Testing of Hypothesis	**2**	**2 Hours**	**-**	**50**	**50**	**1**
	TOTAL	**33**					**20**

Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1721UCSPC	Core6: Programming with C	3	2 ½ hrs	25	75	100	2

Sr. No.	Modules / Units
1	**UNIT 1**
	Structure of C program: Header and body, Use of comments. Interpreters vs compilers, Python vs C. Compilation of a program. Formatted I/O: printf(), scanf(). **Data:** Variables, Constants, data types like: int, float char, double and void, short and long size qualifiers, signed and unsigned qualifiers. Compare with datatypes in Python. Compare static typing in C vs dynamic typing in Python **Variables:** Declaring variables, scope of the variables according to block, hierarchy of data types. Compare explicit declarations in C with implicit declarations in Python. **Types of operators:** Arithmetic, relational, logical, compound assignment, increment and decrement, conditional or ternary, bitwise and comma operators. Precedence and order of evaluation, statements and Expressions. Automatic and explicit type conversion. **Iterations:** Control statements for decision making: (i) Branching: if statement, else.. if statement, (does the writer mean if-else or nested ifs)switch statement. (ii) Looping: while loop, do.. while, for loop. (iii) Jump statements: break, continue and goto.
2	**UNIT 2**
	Arrays: (One and two dimensional), declaring array variables, initialization of arrays, accessing array elements. Compare array types of C with list and tuple types of Python. **Data Input and Output functions:** Character I/O format: getch(), getche(), getchar(), getc(), gets(), putchar(), putc(), puts(). **Manipulating Strings:** Declaring and initializing String variables, Character and string handling functions. Compare with Python strings. **Functions:**

	Function declaration, function definition, Global and local variables, return statement, Calling a function by passing values. **Recursion:** Definition, Recursive functions. **Pointer:** Fundamentals, Pointer variables, Referencing and de-referencing, Pointer Arithmetic, Using Pointers with Arrays, Using Pointers with Strings, Array of Pointers, Pointers as function arguments, Functions returning pointers. **Dynamic Memory Allocation:** malloc(), calloc(), realloc(), free() and sizeof operator. Compare with automatic garbage collection in Python.
3	**UNIT 3**
	Structure: Declaration of structure, reading and assignment of structure variables, Array of structures, arrays within structures, structures within structures. Compare C structures with Python tuples. **Unions:** Defining and working with unions. **File handling:** Different types of files like text and binary, Different types of functions: fopen(), fclose(), fgetc(), fputc(), fgets(), fputs(), fscanf(), fprintf(), getw(), putw(), fread(), fwrite(), fseek().

Reference Books
Programming with C
Text book: 1. Pradip Dey, Manas Ghosh, "Programming in C", second edition, Oxford University Press 2. Yashavant P. Kanetkar. " Let Us C", BPB Publications **Additional References**: 1. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language (Ancy C Version), 1990

Practical (1721UCSPR)
1. Programs to understand the basic data types and I/O. 2. Programs on Operators and Expressions 3. Programs on Type casting. 4. Programs on decision statements. 5. Programs on looping. 6. Programs on arrays. 7. Programs on variables(global, automatic and static). 8. Programs on functions. 9. Programs on structures and unions. 10. Programs on pointers. 11. Programs on string manipulations. 12. Programs on basic file operations.

Course Code:	Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1722UCSPP	Core 7: Programming with Python	3	2 ½ hrs	25	75	100	2

Sr. No.	Modules / Units
1	
	GUI Programming in Python (using Tkinter/wxPython/Qt) What is GUI, Advantages of GUI, Introduction to GUI library. Layout management, events and bindings, fonts, colours, drawing on canvas (line, oval, rectangle, etc.) Widgets such as: frame, label, button, checkbutton, entry, listbox, message, radiobutton, text, spinbox etc
2	
	Exception handling: What is an exception, various keywords to handle exceptions such try, catch, except, else, finally, raise. **Database connectivity in Python**: Installing mysql connector, accessing connector module module, using connect, cursor, execute & close functions, reading single & multiple results of query execution, executing different types of statements, executing transactions, understanding exceptions in database connectivity.
3	
	Python File Input-Output: Opening and closing files, various types of file modes, reading and writing to files, manipulating directories. Iterables, iterators and their problemsolving applications. **Regular Expressions:** Concept of regular expression, various types of regular expressions, using match function. **Network connectivity**: Socket module, creating server-client programs, sending email, reading from URL

Reference Books
Programming with Python
Text books: 1. Paul Gries , Jennifer Campbell, Jason Montojo, *Practical Programming: An Introduction to Computer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014 **Additional References:** 1. James Payne , *Beginning Python: Using Python 2.6 and Python 3,* Wiley India, 2010 A. Lukaszewski, MySQL for Python: Database Access Made Easy, Pact Publisher, 2010

Practical (1722UCSPR)
1. Programs to read and write files. 2. Programs with iterables and iterators. 3. Program to demonstrate exception handling. 4. Program to demonstrate the use of regular expressions. 5. Program to show draw shapes & GUI controls. (Mini project including database connectivity) 6. Program to create server-client and exchange basic information. 7. Program to send email & read contents of URL.

Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1723UCSLX	Core 8: Linux	3	2 1/2 Hours	25	75	100	2

Sr.No.	Modules / Units
1	**UNIT 1**
	Overview of Operating Systems. Introduction. What is an Operating System?, Operating System Services. Character Versus Graphical User Interfaces. Types of Operating Systems. The LINUX Family. **LINUX History.** Introduction. , Open Source Background. LINUX Distributions. Kernel History. Popularity of LINUX. Future Developments. **Introduction to Computer System Hardware.** LINUX Software Architecture. Logging On and Logging Off. **Essential Linux commands** - Commands for files and directories creating and viewing files using cat, cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, file comparisons – cmp & comm, View files, disk related commands, checking disk free spaces, chmod with its options, cal,date,who,tty, lp,stty. **Installation of Unix/Linux system**– Unix/Linux Installation requirement, complete Procedure steps, Partitioning the Hard drive, System startup and shut-down process, init and run levels. File system mounting, lpstat, backup strategy, installing software on Unix/Linux **LINUX Shells.** Introduction, Various LINUX Shells. Some Useful General-Purpose Commands.Shell Metacharacters.
2	**UNIT 2**
	Files and File System Structure. Introduction. The LINUX File Concept. Types of Files., File System Structure. Navigating the File Structure., File Representation and Storage in LINUX. Standard Files and File Descriptors. End of File (eof) Marker. **Basic File Processing.** Introduction. Viewing Contents of Text Files. Copying, Moving, and Removing Files. Appending to Files. Combining Files. Comparing Files. Removing Repeated

	Lines. Printing Files and Controlling Print Jobs. **File Security.** Introduction. Password-Based Protection. Protection-Based on Access Permission. Determining and Changing File Access Privileges. File Permissions and Types. **Advanced File Processing.** Regular Expressions. Compressing Files. Sorting Files. Searching for Commands and Files. Searching Files. Cutting and Pasting.
3	**UNIT 3**
	Redirection and Piping. Introduction. Standard Files. Input Redirection. Output Redirection. Combining Input and Output Redirection. I/O Redirection with File Descriptors. **LINUX pipes**. Redirection and Piping Combined. Error Redirection in the TC Shell. **Filters:** head, tail , wc, pr, cut, paste, sort, uniqe, grep, egrep, fgrep ,tee **Processes.** Introduction. Running Multiple Processes Simultaneously. LINUX Process States. Execution of Shell Commands. Process Attributes. Process and Job Control. Process Hierarchy in LINUX. **Introductory Bash Programming.** Introduction. Running a Bash Script. Shell Variables and Related Commands. Passing Arguments to Shell Scripts. Comments and Program Headers. Program Control Flow Commands. **Introductory TC Shell Programming.** Introduction. Running a TC Shell Script. Shell Variables and Related Commands. Passing Arguments to Shell Scripts. Comments and Program Headers. Program Control Commands.

Reference Books
Linux
Text books: 1. Linux: The Textbook, Syed mansoor sarwar, Robert kortskey , Syed Aqeel Sarwar,- Pearson Education **Additional References:** 1. Using Linux – David Bandel and napier – Pearson Education Linux Bible, 9th Edition, Christopher Negus, Wiley Publications ,April 2015

Practical (1723UCSPR)

1. Linux Installation:
   a. Install your choice of Linux distribution e.g. Ubuntu, Fedora, Debian.
2. Installing and Removing Software:
   a. Install gcc package. Verify that it runs, and then remove it.
3. Study of Basic commands of Linux/UNIX as in Unit 1
4. Study of Advance commands and filters of Linux/UNIX.as in unit 2
5. Study of general purpose utilities commands.
6. Study of user & group management commands.
7. Study of file system navigation commands, text processing tools, communication commands.
8. Study of VI editor.
9. Study of Shell Script.
10. Execute C & C++ programs in Linux.
11. Back up using TAR command.

Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1724UCSDS	Core 9: Data Structures	3	2 1/2 Hours	25	75	100	2

Sr.No.	Modules / Units
1	**UNIT 1**
	Searching and Sorting: Searching-Linear Search, Binary Search, Sorting-Bubble, Selection and Insertion Sort, Working with Sorted Lists-Maintaining Sorted Lists **Algorithm Analysis:** Complexity Analysis- Asymptotic notations, Evaluating Python Code, Evaluating Python List, Amortized Cost, Evaluating Set ADT, Application **Abstract Data Types:** Introduction, The Date Abstract Data Type, Bags, Iterators. Application **Arrays:** Array Structure, Python List, Two Dimensional Arrays, Matrix Abstract Data Type, Application **Sets and Maps:** Sets-Set ADT, Selecting Data Structure, List based Implementation, Maps-Map ADT, List Based Implementation, Multi-Dimensional Arrays-Multi-Array
2	**UNIT 2**
	Linked Structures: Introduction, Singly Linked List-Traversing, Searching, Prepending and Removing Nodes, Bag ADT-Linked List Implementation. Comparing Implementations, Linked List Iterators, More Ways to Build Kinked Lists, Applications-Polynomials **Stacks**: Stack ADT, Implementing Stacks-Using Python List, Using Linked List, Stack Applications-Balanced Delimiters, Evaluating Postfix Expressions **Queues**: Queue ADT, Implementing Queue-Using Python List, Circular Array, Using List, Priority Queues- Priority Queue ADT, Bounded and unbounded Priority Queues **Advanced Linked List**: Doubly Linked Lists-Organization and Operation, Circular Linked List-Organization and Operation, Multi Lists
3	**UNIT 3**
	Hash Table: Introduction, Hashing-Linear Probing, Clustering, Rehashing, Separate Chaining, Hash Functions **Advanced Sorting:** Merge Sort, Quick Sort, Radix Sort, Sorting Linked List **Binary Trees:** Tree Structure, Binary Tree-Properties, Implementation and Traversals,Expression Trees, Heaps and Heapsort,Search Trees

Reference Books
Data Structures

Text books:

1) *Data Structure and algorithm Using Python*, Rance D. Necaise, 2016 Wiley India Edition

2) *Data Structure and Algorithm in Python*, Michael T. Goodrich, Robertom Tamassia, M. H. Goldwasser, 2016 Wiley India Edition

Additional References:

1) *Data Structure and Algorithmic Thinking with Python*- Narasimha Karumanchi, 2015, Careermonk Publications

2) Fundamentals of Python: Data Structures, Kenneth Lambert, Delmar Cengage Learning

Practical (1724UCSPR)

1. Implement Linear Search to find an item in a list.
2. Implement binary search to find an item in an ordered list.
3. Implement Sorting Algorithms and compare the execution time:
   a) Bubble sort
   b) Insertion sort
   c) Quick sort
   d) Merge Sort
4. Implement use of Sets and various operations on Sets.
5. Implement working of Stacks. (pop method to take the last item added off the stack and a push method to add an item to the stack)
6. Implement Program for
   a) Infix to Postfix conversion
   b) Postfix Evaluation
7. Implement the following
   a) A queue as a list which you add and delete items from.
   b) A circular queue. (The beginning items of the queue can be reused).
8. Implement Linked list to represent
   a) a polynomial and perform addition/subtraction.
   b) Student record and search for the information of a particular student
9. Implement Binary Tree and its traversals.
10. Implement a hash table

Course Code:	Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1725UCSCC	Core 10: Calculus for Computer Science	3	2 ½ hrs	25	75	100	2

Sr. No.	Modules / Units
1	**UNIT 1**
	DERIVATIVES AND ITS APPLICATIONS: Review of Functions, limit of a function, continuity of a function, derivative unction. Derivative In Graphing And Applications: Analysis of Functions: Increase, Decrease, Concavity, Relative Extrema; Graphing Polynomials, Rational Functions, Cusps and Vertical • Tangents. Absolute Maxima and Minima, Applied Maximum and Minimum Problems, Newton's Method.
2	**UNIT 2**
	INTEGRATION AND ITS APPLICATIONS: • An Overview of the Area Problem, Indefinite Integral, Definition of Area as a Limit; Sigma Notation, Definite Integral, Evaluating Definite Integrals by Substitution, Area Between Two Curves, Length of a Plane Curve. Numerical Integration: Simpson's Rule. Modeling with Differential Equations, Separation of Variables, Slope Fields, Euler's Method, First- Order Differential Equations and Applications.
3	**UNIT 3**
	PARTIAL DERIVATIVES AND ITS APPLICATIONS: • Functions of Two or More Variables Limits and Continuity Partial Derivatives, Differentiability, Differentials, and Local Linearity, Chain Rule, Directional Derivatives and Gradients, Tangent Planes and Normal, Vectors, Maxima and Minima of Functions of Two Variables.

Reference Books
Introduction to Financial Accounts

Text books:

1. Calculus: Early transcendental (10th Edition): Howard Anton, Irl Bivens, Stephen Davis, John Wiley & sons, 2012.

Additional References:

1. Calculus and analytic geometry (9th edition): George B Thomas, Ross L Finney, Addison Wesley, 1995
2. Calculus: Early Transcendentals (8th Edition): James Stewart, Brooks Cole, 2015.
3. Calculus (10th Edition): Ron Larson, Bruce H. Edwards, Cengage Learning, 2013.
4. Thomas' Calculus (13th Edition): George B. Thomas, Maurice D. Weir, Joel R. Hass, Pearson, 2014.

Practical (1725UCSPR)
1. Continuity of functions; Derivative of functions 2. Increasing, decreasing, concave up and concave down functions 3. Relative maxima, relative minima, absolute maxima, absolute minima 4. Newton's method to find approximate solution of an equation 5. Area as a limit and length of a plane curve 6. Numerical integration using Simpson's rule 7. Solution of a first order first degree differential equation, Euler's method 8. Calculation of Partial derivatives of functions 9. Local linear approximation and directional derivatives 10. Maxima and minima of functions of two variables

Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1726UCSGC	Core 11: Green Computing	3	2 1/2 Hours	25	75	100	2

Sr.No.	Modules / Units
1	**UNIT 1**
	FUNDAMENTALS of GREEN IT Green IT Fundamentals, **Problems:** Toxins, Power Consumption, Equipment Disposal , **Green computing:** carbon foot print, scoop on power, **Green IT Strategies:** Drivers, Dimensions, and Goals, **Environmentally Responsible Business:** Policies, Practices, and Metrics. **Governance and Regulatory Issues** Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia, Europe, WEEE Directive, RoHS, National Adoption, Asia: Japan, China, Korea. **Minimizing Power Usage:** Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, Low-Power Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software.
2	**UNIT 2**
	Cooling: Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised Floors, Cable Management, Vapour Seal, Prevent Recirculation of Equipment Exhaust, Supply Air Directly to Heat Sources, Fans, Humidity, Adding Cooling, Fluid Considerations, System Design, Datacentre Design, Centralized Control, Design for Your Needs, Put Everything Together. **Grid Framework:**Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework. **Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles.

3	UNIT 3
	Green Data Storage: Introduction , Storage Media Power Characteristics, Energy Management Techniques for Hard Disks, System-Level Energy Management **Green Networks and Communications:** Introduction, Objectives of Green Network Protocols, Green Network Protocols and Standards **Recycling:** Problems, China, Africa, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online **Green Assets** **Greening Your Information Systems:** Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling. **Green Data Centres:** Data Centres and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Centre Metrics **Staying Green:** Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyse Data, Conduct Audits, Certifications, Benefits, Realities, Helpful Organizations

Reference Books

Statistics for Computer Science

Reference books:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, Green IT, McGraw Hill, 2008
2. Alvin Galea, Michael Schaefer, Mike Ebbers, Green Data Center: Steps for the Journey, Shroff Publishers and Distributers, 2011
3. Jason Harris, Green Computing and Green IT Best Practice, Emereo
4. Bud E. Smith, Green Computing Tools and Techniques for Saving Energy, Money and Resources, CRC Press, 2014
5. San Murugesan, G. R. Ganadharan, Harnessing Green IT: Principles and Practices, Wiley & IEEE

Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1627UCSSM	DSE-Allied 2: Statistical Methods and Testing of Hypothesis	3	2 1/2 Hours	25	75	100	2

Sr.No.	Modules / Units
1	**UNIT 1**
	Standard distributions: random variable; discrete, continuous, expectation and variance of a random variable, pmf, pdf, cdf, reliability, Introduction and properties without proof for following distributions; binomial, normal, chi-square, t, F. Examples
2	**UNIT 2**
	Hypothesis testing: one sided, two sided hypothesis, critical region, p-value, tests based on t, Normal and F, confidence intervals. Analysis of variance : one-way, two-way analysis of variance
3	**UNIT 3**
	Non-parametric tests: need of non-parametric tests, sign test, Wilicoxon's signed rank test, run test, Kruskal-Walis tests. Post-hoc analysis of one-way analysis of variance : Duncan's test Chi-square test of association

Reference Books

Discrete Mathematics

Text books:

1. Trivedi, K.S.(2009) : Probability, Statistics, Design of Experiments and Queuing theory, with applications of Computer Science, Prentice Hall of India, New Delhi

Additional References:

1. Ross, S.M. (2006): A First course in probability. 6th Edn Pearson
2. Kulkarni, M.B., Ghatpande, S.B. and Gore, S.D. (1999): Common statistical tests. Satyajeet Prakashan, Pune
3. Gupta, S.C. and Kapoor, V.K. (2002) : Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi
4. Gupta, S.C. and Kapoor, V.K. (4th Edition) : Applied Statistics, S. Chand and Son's, New Delhi
5. Montgomery, D.C. (2001): Planning and Analysis of Experiments, Wiley.

Practical (1727UCSPR)

1. Problems based on binomial distribution
2. Problems based on normal distribution
3. Property plotting of binomial distribution
4. Property plotting of normal distribution
5. Plotting pdf, cdf, pmf, for discrete and continuous distribution
6. t test, normal test, F test
7. Analysis of Variance
8. Non parametric tests- I
9. Non- Parametric tests – II
10. Post-hoc analysis of one-way analysis

Evaluation Scheme

I. Internal Exam-25 Marks

(i) Test– 20 Marks - Duration 40 mins

It will be conducted either as a written test or using any open source learning management system such as Moodle (Modular object-oriented dynamic learning environment)Or a test based on an equivalent online course on the contents of the concerned course(subject)offered by or build using MOOC (Massive Open Online Course)platform.

(ii) 5 Marks - Active participation in routine class instructional deliveries

Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

II. External Examination- 75 Marks

(i) Duration - 2.5 Hours.

(ii) Theory question paper pattern:-

All questions are compulsory.		
Question	Based on	Marks
Q.1	Unit I	20
Q.2	Unit II	20
Q.3	Unit III	20
Q.4	Unit I,II and III	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d & e, etc & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination – 50 marks (Duration: 2 Hours)

- Each practical course carries 50 Marks : 40 marks + 05 marks (journal)+ 05 marks(viva)
- Minimum 75% practical from each core/allied course are required to be completed and written in the journal**.**

(Certified Journal is compulsory for appearing at the time of Practical Exam)