

Proposed Syllabus

For

B.Sc. (Program) in Computer Science

Submitted

To



ENLIGHTENMENT TO PERFECTION

**University of North Bengal**

(Accredited by NAAC with grade A)

Under

Choice Based Credit System (CBCS)

[With effect from the Session 2018-19]

## **PREAMBLE**

The University Grants Commission (UGC) has initiated several measures to bring equity, efficiency and excellence in the Higher Education System of country. The important measures taken to enhance academic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters.

The UGC has formulated various regulations and guidelines from time to time to improve the higher education system and maintain minimum standards and quality across the Higher Educational Institutions (HEIs) in India. The academic reforms recommended by the UGC in the recent past have led to overall improvement in the higher education system. However, due to lot of diversity in the system of higher education, there are multiple approaches followed by universities towards examination, evaluation and grading system. While the HEIs must have the flexibility and freedom in designing the examination and evaluation methods that best fits the curriculum, syllabi and teaching-learning methods, there is a need to devise a sensible system for awarding the grades based on the performance of students. Presently the performance of the students is reported using the conventional system of marks secured in the examinations or grades or both. The conversion from marks to letter grades and the letter grades used vary widely across the HEIs in the country. This creates difficulty for the academia and the employers to understand and infer the performance of the students graduating from different universities and colleges based on grades.

The grading system is considered to be better than the conventional marks system and hence it has been followed in the top institutions in India and abroad. So it is desirable to introduce uniform grading system. This will facilitate student mobility across institutions within and across countries and also enable potential employers to assess the performance of students. To bring in the desired uniformity, in grading system and method for computing the cumulative grade point average (CGPA) based on the performance of students in the examinations, the UGC has formulated these guidelines.

**CHOICE BASED CREDIT SYSTEM (CBCS):**

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

**Outline of Choice Based Credit System:**

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 which 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 interdisciplinary nature (to be offered by 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 other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

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

**3.1 AE Compulsory Course (AECC):** Environmental Science, English Communication/MIL Communication.

**3.2 AE Elective Course (AEEC):** These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

**Project work/Dissertation** is considered as a special course involving application of knowledge in solving / analyzing /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.

**Course Structure**

<b>SEMESTER</b>	<b>CORE COURSE (12)</b>	<b>ABILITY ENHANCEMENT COMPULSORY COURSE (AECC) (2)</b>	<b>SKILL ENHANCEMENT COURSE (SEC) (4)</b>	<b>ELECTIVE: DISCIPLINE SPECIFIC DSE (6)</b>
<b>I</b>	<b>Computer System Architecture (Theory + Tutorial) (5 + 1)</b>	<b>(English/MIL Communication) /Environmental Science</b>		
	<b>DSC - 2A</b>			
	<b>DSC - 3A</b>			
<b>II</b>	<b>Programming Fundamentals using C (Theory + Practical) (4 + 2)</b>	<b>(English/MIL Communication) /Environmental Science</b>		
	<b>DSC - 2B</b>			
	<b>DSC - 3B</b>			
<b>III</b>	<b>Computer Networks (Theory + Tutorial) (5 + 1)</b>		<b>SEC - 1</b>	
	<b>DSC - 2C</b>			
	<b>DSC - 3C</b>			
<b>IV</b>	<b>Data Structures (Theory + Practical) (4 + 2)</b>		<b>SEC - 2</b>	
	<b>DSC - 2D</b>			
	<b>DSC - 3D</b>			
<b>V</b>			<b>SEC - 3</b>	<b>DSE - 1A</b>
				<b>DSE - 2A</b>
				<b>DSE - 3A</b>
<b>VI</b>			<b>SEC-4</b>	<b>DSE - 1B</b>
				<b>DSE - 2B</b>
				<b>DSE - 3B</b>

**Distribution of Credits**

<b>SEMESTER-I</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course wise class (L+T+P)</b>	<b>Credit</b>
CC-1	Computer System Architecture	Core Theory	5
CC-1T	Computer System Architecture Tutorials	Core Tutorial	1
<b>DSC - 2A</b>	To be Selected from other Discipline Core	Core	6
<b>DSC - 3A</b>	To be Selected from other Discipline Core	Core	6
AEC-1	Environmental Science	AEC	2
<b>TOTAL</b>	<b>4 Courses</b>	<b>Total</b>	<b>20</b>
<b>SEMESTER-II</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course wise class (L+T+P)</b>	<b>Credit</b>
CC-2	Programming Fundamentals Using C	Core Theory	4
CC-2L	Programming Fundamentals Using C LAB	Core Lab	2
<b>DSC - 2B</b>	To be Selected from other Discipline Core	Core	6
<b>DSC - 3B</b>	To be Selected from other Discipline Core	Core	6
AEC-2	English	AEC	2
<b>TOTAL</b>	<b>4 Courses</b>	<b>Total</b>	<b>20</b>
<b>SEMESTER-III</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course wise class (L+T+P)</b>	<b>Credit</b>
CC-3	Computer Networks	Core Theory	5
CC-3T	Computer Networks Tutorials	Core Tutorial	1
<b>DSC - 2C</b>	To be Selected from other Discipline Core	Core	6
<b>DSC - 3C</b>	To be Selected from other Discipline Core	Core	6
SEC-1	Office Automation Tools	SEC	2
<b>TOTAL</b>	<b>4 Courses</b>	<b>Total</b>	<b>20</b>

<b>SEMESTER-IV</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course wise class (L+T+P)</b>	<b>Credit</b>
CC-4	Data Structures	Core Theory	4
CC-4L	Data Structures Lab	Core Lab	2
<b>DSC – 2D</b>	To be Selected from other Discipline Core	Core	6
<b>DSC – 3D</b>	To be Selected from other Discipline Core	Core	6
SEC-2	HTML Programming.	SEC Theory	2
<b>TOTAL</b>	<b>4 Courses</b>	<b>Total</b>	<b>20</b>
<b>SEMESTER-V</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course wise class (L+T+P)</b>	<b>Credit</b>
DSE-1A	Any one of the following: 1. Data Base Management Systems 2. Operating Systems	DSE Theory	5
DSE-1A T	Tutorials related to the subjected chosen for DSE-1 1. Data Base Management Systems Tutorials 2. Operating Systems Tutorials	DSE Tutorial	1
DSE-2A	To be Selected from other Discipline Elective	DSE	6
DSE-3A	To be Selected from other Discipline Elective	DSE	6
SEC-3	Visual Basic Programming.	SEC	2
<b>TOTAL</b>	<b>4 Courses</b>	<b>Total</b>	<b>20</b>
<b>SEMESTER-VI</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course wise class (L+T+P)</b>	<b>Credit</b>
DSE – 1B	Project Work	DSE	6
DSE -2B	To be Selected from other Discipline Elective	DSE	6
DSE -3B	To be Selected from other Discipline Elective	DSE	6
SEC-4	My SQL	SEC	2
<b>TOTAL</b>	<b>4 Courses</b>	<b>Total</b>	<b>20</b>
<b>TOTAL(All Semesters)</b>	<b>24 Courses</b>	<b>Total</b>	<b>120</b>

<b>COURSES TO BE OFFERED BY OTHER DEPARTMENTS</b>	
Core Courses	DSC-1A
	DSC-1B
	DSC-2A
	DSC-2B
	DSC-3A
	DSC-3B
	DSC-4A
	OSC-4B
Discipline Specific Electives	DSE-2A
	DSE-3A
	DSE-2B
	DSE-3B

<b>No Of Classes per Week</b>			
	Lecture(L)	Tutorial(T)	Practical(P)
Core Course (CC)	4	1	4
Discipline Specific Course(DSC)	4	1	4
Skill Enhancement Course (SEC)	1	1	2

**Core Papers: Computer Science (Credit: 06 each) (1 period / week for tutorials or 4 periods / week of practical)**

1. Computer System Architecture
2. Programming Fundamentals using C
3. Computer Networks
4. Data Structures

**Discipline Specific Elective Papers: (Credit: 06 each) (DSE-1A, DSE -1B)**

**Choose 1 from DSE-1A**

**Options for DSE-1A:**

1. Data Base Management Systems
2. Operating Systems

**Options for DSE-1B:**

1. Project Work / Dissertation

**Note:** Universities may include more options or delete some from this list

**Skill Enhancement Courses (Credits: 02 each) - SEC1, SEC2, SEC3, SEC4****SEC1:** Office Automation Tools**SEC2:** HTML Programming.**SEC3:** Visual Basic Programming.**SEC4:** My SQL**Note:** Universities may include more options or delete some from this list **Important:**

1. Each University/Institute should provide a brief write-up about each paper outlining the salient features, utility, learning objectives and prerequisites.
2. University/Institute can add/delete some experiments of similar nature in the Laboratory papers.
3. The size of the practical group for practical papers is recommended to be 10-15 students.
4. University/Institute can add to the list of reference books given at the end of each paper.



**CORE COURSES (UNDER UNDERGRADUATE PROGRAMME COURSES IN  
COMPUTER SCIENCE)**

**COMPUTER SCIENCE (CC-1): Computer System Architecture**

**Total Marks: 100**

**Theory 80**

**Internal Assessment: 20**

**Theory: 30 Lectures**

**Unit 1: Introduction**

Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

**Unit 2: Data Representation and Basic Computer Arithmetic**

Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

**Unit 3: Basic Computer Organization and Design**

Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

**Unit 4: Central Processing Unit**

Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

**Unit 5: Memory Organization**

Cache memory, Associative memory mapping.

**Unit 6: Input-Output Organization**

Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

**Suggested Readings:**

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India, 2009
4. M.M. Mano, Digital Design, Pearson Education Asia, 2013

**COMPUTER SCIENCE (CC-2): Programming Fundamentals using C****Total Marks: 50****Theory: 40****Internal Assessment: 10****Theory: 30 Lectures****Unit 1: Introduction to C**

History of C, Using main() function, Compiling and Executing Simple Programs in C++.

**Unit 2: Data Types, Variables, Constants, Operators and Basic I/O**

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

**Unit 3: Expressions, Conditional Statements and Iterative Statements**

Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch- case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

**Unit 4: Functions and Arrays**

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays ( Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

**Unit 5: Derived Data Types (Structures and Unions)**

Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

**Unit 6: Pointers and References in C**

Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values.

**Unit 7: Memory Allocation in C**

Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

**Unit 8: File I/O, Preprocessor Directives**

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros.

**Suggested Readings:**

1. Tennence W.Pratt, “Programming languages design and implementation”, Prentice Hall of India.
2. Allen B. Tucker, “Programming Languages”, Tata McGraw Hill.
3. Gottfried BS – Programming with C, TMH pub.
4. Balagurusamy:ANSI C TMH
5. Kanetkar, Yashvant – Understanding Pointers in C- 2nd Edn. BPB
6. Kanetkar, Yashvant - Let us C. - 3rd revised Edn. BPB
7. Roosta- Foundation of Programming Languages, Vikas
8. Jeyapooan- A First Course in Prog with C, Vikas

**COMPUTER SCIENCE (CC-2 L): Programming Fundamentals using C Lab (50 Marks)****Practical: 8 Lectures**

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series

$$S = 1 + 1/2 + 1/3 + 1/4 + \dots$$

4. WAP to compute the sum of the first n terms of the following series

$$S = 1 - 2 + 3 - 4 + 5 \dots$$

5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.

9. WAP to print a triangle of stars as follows (take number of lines from user):

```
      *
     ***
    *****
   *********
  **********
```

10. WAP to perform following actions on an array entered by the user:

- i) Print the even-valued elements
- ii) Print the odd-valued elements
- iii) Calculate and print the sum and average of the elements of array
- iv) Print the maximum and minimum element of array
- v) Remove the duplicates from the array
- vi) Print the array in reverse order

The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.

11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.

12. Write a program that swaps two numbers using pointers.

13. Write a program in which a function is passed address of two variables and then alter its contents.

14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.

15. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.

16. Write a menu driven program to perform following operations on strings:

- a) Show address of each character in string
- b) Concatenate two strings without using strcat function.
- c) Concatenate two strings using strcat function.
- d) Compare two strings
- e) Calculate length of the string (use pointers)
- f) Convert all lowercase characters to uppercase
- g) Convert all uppercase characters to lowercase

- h) Calculate number of vowels
  - i) Reverse the string
17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
  18. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
  19. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
  20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
    - a) Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
      - b) a) Sum b) Difference c) Product d) Transpose
  21. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
  22. Write a program to retrieve the student information from file created in previous question and print it in following format:
  23. Copy the contents of one text file to another file, after removing all whitespaces.
  24. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
  25. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

### **COMPUTER SCIENCE (CC-3): Computer Networks**

**Total Marks: 100**

**Theory: 80**

**Internal Assessment: 20**

**Theory: 30 Lectures**

#### **Unit 1: Introduction to Computer Networks**

Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

#### **Unit 2: Data Communication Fundamentals and Techniques**

Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation;- multiplexing techniques- FDM, TDM; transmission media.

**Unit 3: Networks Switching Techniques and Access mechanisms**

Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

**Unit 4: Data Link Layer Functions and Protocol**

Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols-stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

**Unit 5: Multiple Access Protocol and Networks**

CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks-repeaters, hubs, switches, bridges, router and gateways;

**Unit 6: Networks Layer Functions and Protocols**

Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols

**Suggested Readings:**

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM, 2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002
3. Dr. Rakesh Kumar Mandal: Computer Networks for Students, First Edition, SPD, 2018

**COMPUTER SCIENCE (CC-4): Data Structures**

**Total Marks: 50**

**Theory: 40**

**Internal Assessment: 10**

**Theory: 30 Lectures**

**Unit 1: Arrays**

Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation)

**Unit 2: Stacks**

Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack

**Unit 3: Linked Lists**

Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack in Lists; Self Organizing Lists; Skip Lists

**Unit 4: Queues**

Array and Linked representation of Queue, De-queue, Priority Queues

**Unit 5: Recursion**

Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)

**Unit 6: Trees**

Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion , Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).

**Unit 7: Searching and Sorting (5 Lectures)**

Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques

**Suggested Readings:**

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.  
SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
2. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++.", Second edition, PHI, 2009.
3. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson,1999.
4. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010.
5. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd edition, 2011
6. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.
7. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
8. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
9. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley,2013
10. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
11. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.

**COMPUTER SCIENCE (CC-4 L): Data Structures Lab (50 Marks)**

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.

3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration
12. WAP to display fibonacci series (i)using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
14. WAP to create a Binary Search Tree and include following operations in tree:
  - (i) Insertion (Recursive and Iterative Implementation)
  - (ii) Deletion by copying
  - (iii) Deletion by Merging
  - (iv) Search a no. in BST
  - (v) Display its preorder, postorder and inorder traversals Recursively
  - (vi) Display its preorder, postorder and inorder traversals Iteratively
  - (vii) Display its level-by-level traversals
  - (viii) Count the non-leaf nodes and leaf nodes
  - (ix) Display height of tree
  - (x) Create a mirror image of tree
  - (xi) Check whether two BSTs are equal or not
15. WAP to convert the Sparse Matrix into non-zero form and vice-versa.



**Discipline Specific Elective Papers: (Credit: 06 each) (DSE-1A, DSE -1B)****Choose 1 from DSE-1A****Options for DSE-1A:**

1. Data Base Management Systems
2. Operating Systems

**DSE-1B:**

Project Work / Dissertation

**DSE-1A****DSE-1A (a) Data Base Management Systems**

**Total Marks: 50**

**Theory: 40**

**Internal Assessment: 10**

**Theory: 30 Lectures**

**Unit 1: Introduction**

Characteristics of database approach, data models, database system architecture and data independence.

**Unit 2: Entity Relationship(ER) Modeling**

Entity types, relationships, constraints.

**Unit 3: Relation data model**

Relational model concepts, relational constraints, relational algebra, SQL queries

**Unit 4: Database design**

Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (up to BCNF).

**Unit 5: Transaction Processing**

ACID properties, concurrency control

**Unit 6: File Structure and Indexing**

Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files( Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

**Suggested Readings:**

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.

### DSE-1A L (a) (50 Marks)

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

Create and use the following database schema to answer the given queries.

#### EMPLOYEE Schema

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

#### DEPARTMENT Schema

Field	Type	NULL	KEY	DEFAULT
Dno	Integer	No	PRI	NULL
Dname	Varchar(50)	Yes		NULL
Location	Varchar(50)	Yes		New Delhi

### Query List:

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE\_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than \$2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.

9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don't have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.
13. Query to display Name of all the employees where the third letter of their name is A.
14. Query to display Name of all employees either have two Rs or have two As in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 \* Current Salary >. Label the Column as Dream Salary.
20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with J, A, and M.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an A in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.

**DSE-1A (b) Operating Systems****Total Marks: 100****Theory: 80****Internal Assessment: 20****Unit 1: Introduction**

Basic OS functions, resource abstraction, types of operating systems—multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems.

**Unit 2: Operating System Organization**

Processor and user modes, kernels, system calls and system programs.

**Unit 3: Process Management**

System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent and processes, critical section, semaphores, methods for inter-process communication; deadlocks.

**Unit 4: Memory Management**

Physical and virtual address space; memory allocation strategies –fixed and variable partitions, paging, segmentation, virtual memory

**Unit 5: File and I/O Management (10 Lectures)**

Directory structure, file operations, file allocation methods, device management.

**Unit 6: Protection and Security (4 Lectures)**

Policy mechanism, Authentication, Internal access Authorization.

**Suggested Readings:**

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

**DSE-1B Project work / Dissertation****Total Marks: 100****Project: 100**

This option is to be offered only in 6<sup>th</sup> Semester.

The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.

The group size should be maximum of three (03) students.

Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.

A maximum of Four (04) projects would be assigned to one teacher.

**Skill Enhancement Courses****Skill Enhancement Courses (Credit: 02 each) – SEC-1, SEC-2, SEC-3, SEC-4****Theory: 02 / Labs: 02****SEC-1:** Office Automation Tools**SEC-2:** HTML Programming.**SEC-3:** Visual Basic Programming.**SEC-4:** My SQL**Note:** Universities may include more options or delete some from this list**Detailed Syllabus:****SEC-1: Office Automation Tools****Total Marks: 50****Practical: 40****Internal Assessment: 10****2 Lectures , 2 Practicals ( each in group of 10 to 15)****Introduction to open office/MS office/Libre office (2L)****Word Processing:** Formatting Text, Pages, Lists, Tables (5L)**Spreadsheets:** Worksheets, Formatting data, creating charts and graphs, using formulas and functions, macros, Pivot Table (6L)**Presentation Tools:** Adding and formatting text, pictures, graphic objects, including charts, objects, formatting slides, notes, hand-outs, slide shows, using transitions, animations (4L)**Suggested Readings:**

1. Introduction to **HTML** and CSS -- O'Reilly , 2010
2. Jon Duckett, HTML and CSS, John Wiely, 2012

**Computer Lab Based on Office Automation:****Practical List for Text Editor:**

1. Create a **telephone directory**.
  - The heading should be 16-point Arial Font in bold
  - The rest of the document should use 10-point font size
  - Other headings should use 10-point Courier New Font
  - The footer should show the page number as well as the date last updated.
2. Design a time-table form for your college.
  - The first line should mention the name of the college in 16-point Arial Font and should be bold.
  - The second line should give the course name/teacher's name and the department in 14- point Arial. Leave a gap of 12-points.
  - The rest of the document should use 10-point Times New Roman font.
  - The footer should contain your specifications as the designer and date of creation.
3. Create the following one page documents.
  - (a) Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.
  - (b) Design a certificate in landscape orientation with a border around the document.
4. Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
5. Convert following text to a table, using comma as delimiter

Type the following as shown (do not bold).

**Color, Style, Item**

**Blue, A980, Van**

**Red, X023, Car**

**Green, YL724,**

**Truck**

**Name, Age, Sex**

**Bob, 23, M**

**Linda, 46, F**

**Tom, 29, M**

6. Prepare a grocery list having four columns (Serial number, the name of the product, quantity and price) for the month of April, 06.
- Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
  - The headings of the columns should be in 12-point and bold.
  - The rest of the document should be in 10-point Times New Roman.
  - Leave a gap of 12-points after the title.
7. XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.
- (a) The title of the book should appear in bold using 20-point Arial font.
  - (b) The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
  - (c) At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
  - (d) The details of the offices of the publisher (only location) should appear in the footer.
8. Create the following one page documents.
- a) Design a Garage Sale sign.
  - b) Make a sign outlining your rules for your bedroom at home, using a numbered list.
9. Enter the following data into a table given on the next page.

Salesperson	Dolls	Trucks	Puzzles
Amit	1327	1423	1193
Shivi	1421	3863	2934
Om	5214	3247	5467
Ananya	2190	1278	1928
Maharshi	4098	3079	2067

Add a column Region (values: S, N, N, S, S, S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:



**Practical List for Spreadsheet**

Q1. Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using:-

- i) Copy/Paste
- ii) Embedding
- iii) Linking

Q2. The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create 4<sup>th</sup> worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4<sup>th</sup> worksheet should contain college name as the first line. Make it bold, italic and center it.

Q3. Using a simple pendulum, plot 1-T and 1-T<sup>2</sup> graph.

l	t1	t2	t3	Mean(t)	T=t/20	T <sub>2</sub>
70						
80						
90						
100						

Q4. Consider the following employee worksheet:-

Full Name (First Last)	Grade 1/2/3	Basic Salary	HRA	PF	Gross	Net	(VA) Vehicle Allowance

Grade                      HRA %(of Basic)

1                              40%

2                              35%

3                              30%

Gross = Basic + HRA +

VA Net = Gross - PF PF is

8% for all Grades

VA is 15000, 10000 and 7000 for Grades 1, 2 and 3.

- i) Find max, min and average salary of employees in respective Grade
- ii) Count no. of people where VA>HRA
- iii) Find out most frequently occurring grade.
- iv) Extract records where employee name starts with "A" has HRA>10000
- v) Print Grade wise report of all employees with subtotals of net salary and also grand totals. Use subtotal command.
- vi) Extract records where Grade is 1 or 2 and salary is between 10000 and 20000 both inclusive.

Q5. In a meeting of a marketing department of an organization it has been decided that price of selling an item is fixed at Rs40. It was resolved to increase the sell of more of more items and getting the profit of Rs40,000/. Use Goal Seek to find out how many items you will have to sell to meet your profit figure.

Q6. To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P - V and P-I/V. Sample observations are:-

Q7. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).

Q8. Create the following worksheet(s) containing an year wise sale figure of five salesmen in Rs.

Salesman	2002	2003	2004	2005
MOHAN	10000	12000	20000	50000
MITRA	15000	18000	50000	60000
SHIKHA	20000	22000	70000	70000
ROHIT	30000	30000	100000	80000
MANGLA	40000	45000	125000	90000

Apply the following Mathematical & Statistical functions:

- i) Calculate the commission for each salesman under the condition :-
  - a) If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.
  - b) Otherwise, 4% of total sale.
  - c) Calculate the maximum sale made by each salesman.
  - d) Calculate the maximum sale made in each year.

**Practical List for presentation:**

1. Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.
2. Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.
3. Create five Power Point slides detailing the process of internal assessment. It should be a self-running demo.

**SEC-2: HTML Programming**

**Total Marks: 50**

**Practical: 40**

**Internal Assessment: 10**

**2 Lectures , 2 Practicals ( each in group of 10 to 15)**

**Unit-I: Introduction**

Introduction to Web Design: Introduction to hypertext markup language (html) document type definition, creating web pages, graphical elements, lists, hyperlinks, tables, web forms, inserting images, frames.

**Unit-II: The Basics**

The Head, the Body, Colors, Attributes Lists, ordered and unordered

**Unit-III: Links**

Introduction, Relative Links, Absolute Links, Link Attributes  
Using the ID Attribute to Link Within a Document

**Unit-IV: Images**

Putting an Image on a Page o Using Images as Links o Putting an Image in the Background

**Unit-V: Tables**

Creating a Table

Table Headers o Captions

Spanning Multiple Columns o Styling Table

**Unit VI: Forms**

Basic Input and Attributes o Other Kinds of Inputs o Styling forms with CSS

Basic Input and Attributes o Other Kinds of Inputs o Styling forms with CSS

Customized Features: Cascading style sheets, (css) for text formatting and other Manipulations

**Unit VII: JDBC: JDBC Fundamentals, Establishing Connectivity****Suggested Readings:**

1. Introduction to **HTML** and CSS -- O'Reilly , 2010
2. Jon Duckett, HTML and CSS, John Wiely, 2012
3. Web Enabled Commercial Application Development Using Html, Dhtml, javascript, Perl Cgi By Ivan Bayross, BPB Publications, 2009.

**SEC-3: Visual Basic Programming**

**Total Marks: 50**

**Practical: 40**

**Internal Assessment: 10**

**2 Lectures, 2 Practicals ( each in group of 10 to 15)**

**Unit-I: GUI Environment:**

Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.

**Unit-II: Controls:**

Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

**Unit-III: Operations:**

Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data.

**Unit-IV: Decision Making:**

If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

**Unit-V: Forms Handling:**

Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

**Suggested Readings:**

**Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh (Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004))**

**Software Lab Based on Visual Basic:**

1. Practical exercises based on concepts listed in theory using VB.
2. Write a VB application to compute the sum of two variables.
3. Write a VB application to compute the factorial of a number n.
4. Write a VB application to compute the Fibonacci series of a number n.
5. Write a VB application to compute the series of prime numbers till number n.
6. Write a VB application to compute the maximum of three numbers.
7. Write a VB application to compute the sum of odd numbers and even numbers in an array of n integers.
8. Write a VB application to compare the strings.
9. Write a VB application to make a calculator.
10. Write a VB application to choose your hobbies from a list.
11. Write a VB application to illustrate the use of color radio button.
12. Write a VB application to illustrate the use of color scroll bar form.
13. Write a VB application to illustrate the use of color scroll bar label text.
14. Write a VB application to illustrate the use of color text box.
15. Write a VB application to show a timer.

**SEC-4: My SQL****Total Marks: 50****Practical: 40****Internal Assessment: 10**

1. SQL Vs. SQL \* Plus: SQL Commands and Data types, Operators and Expressions, Introduction to SQL \* Plus.
2. Managing Tables and Data:
  - Creating and Altering Tables (Including constraints)
  - Data Manipulation Command like Insert, update, delete
  - SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE
  - Join, Built in functions (4L) Other Database Objects
  - View
  - Synonyms, Index (2L) Transaction Control Statements
  - Commit, Rollback, Savepoint
3. (Introduction to PL/SQL  SQL v/s PL/SQL
4. PL/SQL Block Structure
  - Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)
  - % TYPE and % ROWTYPE
  - Using Cursor (Implicit, Explicit)

**Suggested Readings:**

1. Baron Schwartz, High Performance MySQL, O'Reilly, 2012.
2. Vikram Vaswani , The Complete Reference MySQL , McGraw Hill Educations, 2004.

**Software Lab Based on MySQL (SQL/PL-SQL):****[SQL COMMANDS]**

- 1) SQL\* formatting commands
- 2) To create a table, alter and drop table.
- 3) To perform select, update, insert and delete operation in a table.
- 4) To make use of different clauses viz where, group by, having, order by, union and intersection,
- 5) To study different constraints.

**[SQL FUNCTION]**

- 6) To use oracle function viz aggregate, numeric, conversion, string function.
- 7) To understand use and working with joins.
- 8) To make use of transaction control statement viz rollback, commit and save point.
- 9) To make views of a table.
- 10) To make indexes of a table.

**[PL/SQL]**

- 11) To understand working with PL/SQL
- 12) To implement Cursor on a table.
- 13) To implement trigger on a table

**AEC-1: Environmental Science****Total Marks: 100****Theory: 80****Internal Assessment: 20****Unit 1: Introduction to environmental studies (2 lectures)**

Multidisciplinary nature of environmental studies;  
Scope and importance; Concept of sustainability and sustainable development.

**Unit 2: Ecosystems (6 Lectures)**

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems :

- a) Forest ecosystem
- b) Grassland ecosystem
- c) Desert ecosystem
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Unit 3: Natural Resources: Renewable and Non-renewable Resources (8 Lectures)**

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

**Unit 4: Biodiversity and Conservation (8 Lectures)**

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions;  
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.
- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots

- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions;  
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

**Unit 5: Environmental Pollution (8 Lectures)**

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

**Unit 6: Environmental Policies & Practices (7 Lectures)**

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

**Unit 7: Human Communities and the Environment (6 Lectures)**

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

**Unit 8: Field work (Equivalent to 5 Lectures)**

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site--Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems--pond, river, Delhi Ridge, etc.



**Suggested Readings:**

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
4. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science*, 339: 36---37.
7. McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp. 29---64). Zed Books.
8. McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8<sup>th</sup> edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. Tripathi 1992.
14. Sengupta, R. 2003. *Ecology and economics: An approach to sustainable development*. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.
17. Thapar, V. 1998. *Land of the Tiger: A Natural History of the Indian Subcontinent*.
18. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
19. Wilson, E. O. 2006. *The Creation: An appeal to save life on earth*. New York: Norton.
20. World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press.

**AEC-2: English****Total Marks: 100****Theory: 80****Internal Assessment: 20**

**Preamble:** The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills. Some of these are:

Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, notetaking etc.

While, to an extent, the art of communication is natural to all living beings, in today's world of complexities, it has also acquired some elements of science. It is hoped that after studying this course, students will find a difference in their personal and professional interactions.

The recommended readings given at the end are only suggestive; the students and teachers have the freedom to consult other materials on various units/topics given below. Similarly, the questions in the examination will be aimed towards assessing the skills learnt by the students rather than the textual content of the recommended books.

**1. Introduction:**

- Theory of Communication,
- Types and modes of Communication

**2. Language of Communication:**

- Verbal and Non-verbal (Spoken and Written)
- Personal, Social and Business
- Barriers and Strategies
- Intra-personal, Inter-personal and Group communication

**3. Speaking Skills:**

- Monologue
- Dialogue
- Group Discussion
- Effective Communication/ Miss- Communication
- Interview
- Public Speech

**4. Reading and Understanding**

- Close Reading
  
- Comprehension
- Summary Paraphrasing
- Analysis and Interpretation
- Translation(from Indian language to English and vice-versa)
- Literary/Knowledge Texts

**5. Writing Skills**

- Documenting
- Report Writing
- Making notes
- Letter writing

**Suggested Readings:**

1. *Fluency in English - Part II*, Oxford University Press, 2006.
2. *Business English*, Pearson, 2008.
3. *Language, Literature and Creativity*, Orient Blackswan, 2013.
4. *Language through Literature* (forthcoming) ed. Dr.Gauri Mishra, Dr RanjanaKaul, Dr BratiBiswas