



MAHARSHI DAYANAND UNIVERSITY ROHTAK

(Established under Haryana Act No. XXV of 1975)

'A+' Grade University accredited by NAAC

NOTICE FOR INVITING SUGGESTIONS/COMMENTS ON THE DRAFT SYLLABI OF B.A, B.SC., B.COM. UNDER CBCS

Comments/suggestions are invited from all the stakeholders i.e Deans of the Faculties, HODs, Faculties and Principals of Affiliated Colleges on the Syllabi and Scheme of Examinations of B.A, B.Sc., B.Com. Programmes under CBCS (copy enclosed) through e-mail to the Dean, Academic Affairs upto 15.09.2020, so that the same may be incorporated in the final draft.

Dean Academic Affairs

B.A. Pass Course under Choice Based Credit System

Department of English & Foreign Languages

Proposed Scheme of Examination

SEMESTER	COURSE OPTED	COURSE NAME	Credits (C+T)	Marks	Internal Assessment	Total Marks
I	Ability Enhancement Compulsory Course-I	English Communication/ Environmental Science	4	80	20	100
	Core Course-I DSC 1A	English –I (Language through Literature –I)	6 (5+1)	120	30	150
	Core Course-II DSC 2A	Understanding the Discourse- Literary and Cultural - I	6 (5+1)	120	30	150
	Core Course-III	DSC 3A	6 (5+1)	120	30	150
II	Ability Enhancement Compulsory Course-II	English Communication/ Environmental Sciences	4	80	20	100
	Core course-IV DSC 1B	English –II (Language through Literature –II)	6 (5+1)	120	30	150
	Core course-V DSC 2B	Understanding the Discourse- Literary and Cultural - II	6 (5+1)	120	30	150
	Core Course-VI	DSC 3B	6 (5+1)	120	30	150
III	Skill Enhancement Course -1 SEC-1	Critical Thinking, Analytical reasoning and Problem Solving through Language and Literature	4	80	20	100
	Core Course-VII DSC 1C	Hindi/MIL Communication/ Additional English-1*	6 (5+1)	120	30	150
	Core Course-VIII DSC 2C	British Literature – till 18 th century	6 (5+1)	120	30	150
	Core Course-IX	DSC 3C	6 (5+1)	120	30	150
IV	Skill Enhancement Course -2 SEC -2	Time Management, Reflective Thinking and Multicultural competence through Language and Literature	4	80	20	100
	Core course-X DSC 1D	Hindi/MIL Communication/ Additional English-2***	6 (5+1)	120	30	150
	Core Course-XI DSC 2D	British Literature – 19 th and 20 th centuries	6 (5+1)	120	30	150
	Core Course-XII	DSC 3D	6 (5+1)	120	30	150
V	Skill Enhancement Course -3 SEC-3	Feature Writing for Mass Media/ Writing for Social Media	4	80	20	100
	Generic Elective -1 GE-1	Classical Indian Literature/Medieval Indian Literature/Contemporary Hindi Literature/Women's Writings of India	6 (5+1)	120	30	150

	Discipline Specific Elective -1 DSE-1	American Literature/ Indian Writings in English/African Literature in English	6 (5+1)	120	30	150
	Discipline Specific Elective - 2	DSE-2	6 (5+1)	120	30	150
VI	Skill Enhancement Course -4 SEC-4	Translation from English to MIL and vice versa – Technical Writings/General Writings	4	80	20	100
	Generic Elective – 2 GE-2	Indian Regional Literatures in English Translation/Literature and Environment/Disability Studies	6 (5+1)	120	30	150
	Discipline Specific Elective -3 DSE-3	Postcolonial Studies/Film Studies/ELT	6 (5+1)	120	30	150
	Discipline Specific Elective - 4	DSE-4	6 (5+1)	120	30	150

A. CORE COURSES (Semester I to IV)

1. Understanding the Discourse - Literary and Cultural – I
2. Understanding the Discourse - Literary and Cultural – II
3. British Literature – till 18th century
4. British Literature – 19th and 20th centuries

B. DISCIPLINE SPECIFIC ELECTIVE COURSES (Semesters V and VI)

a) Discipline Specific Elective -1 (Fifth Semester)

(Select any one of the three options)

1. American Literature
2. Indian Writings in English
3. African Literature in English

b) Discipline Specific Elective -3 (Sixth Semester)

(Select any one of the three options)

1. Postcolonial Studies
2. Film Studies
3. English Language Teaching (ELT)

C. GENERIC ELECTIVE COURSES

a) Generic Elective –1 (Fifth Semester)

(Select any one of the four options)

1. Classical Indian Literature
2. Medieval Indian Literature
3. Contemporary Hindi Literature
4. Women's Writings of India

b) Generic Elective –2 (Sixth Semester)

(Select any one of the three options)

1. Indian Regional Literatures in English Translation
2. Literature and Environment
3. Disability Studies

D. SKILL ENHANCEMENT COURSES

a) Skill Enhancement Course -1 (Third Semester)

1. Critical Thinking, Analytical reasoning and Problem Solving through Language and Literature

b) Skill Enhancement Course -2 (Forth Semester)

1. Time Management, Reflective Thinking and Multicultural competence through Language and Literature

c) Skill Enhancement Course -3 (Fifth Semester)

(Select any One of the two options)

1. Feature Writing for Mass Media
2. Writing for Social Media

d) Skill Enhancement Course -4 (Sixth Semester)

(Select any One of the two options)

1. Translation from English to MIL and vice versa – Technical Writings
2. Translation from English to MIL and vice versa – General Writings

E. CORE COURSES OF ENGLISH LANGUAGES

1. English –I (Language through Literature –I (First Semester)
2. English –II (Language through Literature –II (Second Semester)

F. ABILITY ENHANCEMENT COMPULSORY COURSE (SemesterI/II)

1. English Communication

G. */ Additional English-1 and Additional English-2 in Semester III and IV respectively (in lieu of Hindi/MIL Communication) for foreign students. This Course will also be opted by those Indian students who do not qualify to opt for Hindi Communication and for whom our University has no Communication Courses in other MILs.**

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
FACULTY OF HUMANITIES
DEPARTMENT OF ENGLISH & FOREIGN LANGUAGES
B.A. Programme (CBCS)
Semester I

Course: English – I (Language through Literature – I)

Credits: 06 (05 Lectures + 01 Tutorial) [Workload per week: 05 hours for theory and 01 hour each for a tutorial group of 20 students]

Marks: 150 (120 Semester End Examination + 30 Internal Assessment)

Time: 3 Hours

Course Specific Outcomes (CSOs):

CSO 1: Ability to produce all primary sounds and pronounce commonly used words correctly.

CSO 2: Ability to speak and write correct English.

CSO 3: Ability to compose paragraphs of descriptive and reflective types.

CSO 4: Ability to compose business and official letters.

CSO 5: Ability to apply tools of literary appreciation to poetical and narrative compositions.

CSO 6: Ability to comprehend literary compositions with reference to cultural discourse.

Part A

Prescribed Text: *Language and Literature I*, edited by Loveleen Mohan, Randeep Rana and Jaibir Singh Hooda. Orient BlackSwan, 2015. (To be updated and prepared in accordance with the directions of UGBOS, MDU. Due attention will be given to select texts representing major strands of cultural discourse like disability studies, youth culture studies, folklore studies, globalization studies etc.)

Part B

Phonology: Sounds and phonetic symbols of English and transcription; primary stress; (*OALD* is to be followed for both)

Remedial Grammar: Errors in the use of articles, adverbs, adjectives, subject-verb agreement, tenses and modals.

Composition: Composing Official and Business Letters; composing a paragraph of descriptive or reflective type in about 200 words.

Instructions to the paper-setter:

Part A

Question 1 (short answer type questions) will have 12 questions taken from both the sections of the prescribed book. Students will be required to attempt any 08 of them in one sentence each.

12 Marks

Question 2 will have two passages (one each from both the sections). Students will be required to explain one passage with reference to the context.

08 Marks

Question 3: Comprehension. There will be a paragraph/stanza from the prescribed text followed by questions. Questions will be set to test logical thinking, analytical ability and drawing inference.

08 Marks

Questions 4 and 5 will be essay type questions (one each on both sections of the prescribed book) with internal choice to test the ability of the student to appreciate literature and relate it to its cultural context.

16 x 2 = 32 Marks

Part B

Question 6 will have two subparts on (i) transcription and (ii) marking stress. There will be at least 50% choice in both the parts. Students will not be required to transcribe or break the words into syllables for marking stress.

8 x 2 = 16 Marks

Question 7 will be on remedial grammar and may have questions on subparts. There will be at least 50% choice.

24 Marks

Question 8: Students will be required to write a letter. The paper-setter will give details of the addresser and the addressee (there will be internal choice).

10 Marks

Question 9: Students will be required to compose a paragraph in about 200 words on one of the three given topics.

10 Marks

Suggested Books:

Balasubramanian, T. *A Textbook of English Phonetics for Indian Students*. Macmillan, 2012.

Collins Cobuild English Grammar 4th edition. Harper Collins, 2017.

Hewings, Martin. *Advanced Grammar in Use* 2nd edition. CUP, 2005.

Oxford Advanced Learner's Dictionary (OALD) 10th edition, OUP, 2020.

Swan, Michael. *Practical English Usage* 4th edition. OUP, 2017.

Thompson, A. J. and A. V. Martinet. *A Practical English Grammar* 4th edition. OUP, 1997.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
FACULTY OF HUMANITIES
DEPARTMENT OF ENGLISH & FOREIGN LANGUAGES

B.A. Programme (CBCS)

Semester II

Course: English-II (Language through Literature- II)

Credits: 06 (05 Lectures +01 Tutorial) [Workload per Week: 05 hours for theory and 01 hour each for a tutorial group of 20 students]

Marks: 150 (120 Semester End Examination +30 Internal Assessment)

Time: 3 Hours

Course Specific Outcomes (CSOs):

CSO 1: Ability to handle mechanics of English language correctly in speech and writing

CSO 2: Ability to handle nuanced expressions in speech and writing

CSO 3: Ability to expand an idea to compose essays of reflective and argumentative type

CSO 4: Ability to compose reports of academic investigations/research/surveys

CSO 5: Ability to apply tools of literary appreciation to prose and dramatic compositions

CSO 6: Ability to comprehend literary compositions with reference to cultural discourse

CSO 7: Ability to approach cultural discourse intellectually

Part A

Prescribed Text: *Language and Literature II*, edited by Jaibir Singh Hooda, Randeep Rana and Loveleen Mohan. Orient BlackSwan, 2015. (To be updated and prepared in accordance with the directions of UGBOS, MDU. Due attention will be given to select texts representing major strands of cultural discourse emanating from and affecting women, environment, caste, marginality etc.)

Part B

Remedial Grammar:

- (i) Errors in the usage of voice, narration and conjunctions and conditional clauses
- (ii) Correct usage of Phrasal verbs and idiomatic expressions

Composition:

Composing an essay of reflective or argumentative type in about 350 words

Report writing

The art of Compression:

Precis

Instructions to the paper-setter:

Part A

Question 1 (short answer type questions) will have 12 questions taken from both the sections of the prescribed book. Students will be required to attempt any 08 of them in one sentence each.

12 marks

Question 2 will have two passages (one each from both the sections). Students will be required to explain one passage with reference to the context.

12 marks

Question 3 and 4 will be essay type questions (one each on both sections of the prescribed book) with internal choice to test the ability of the student to appreciate literature and understand it as a part of cultural discourse.

18 x 2 = 36 marks

Part B

Question 5 will have two subparts: on (i) and (ii) of remedial grammar. There will be at least 50% choice in both the parts.

10 + 10 = 20 marks

In Question 6, students will be required to write an essay on any one of the four topics.

10 marks

In Question 7, students will be required to write a report in about 300 words. The examiner will give suitable instructions, guidelines and terms of reference. There will be no internal choice in this question.

15 marks

In Question 7, students will be required to write a precis of an unseen prose passage of about 300 words. There will be no internal choice in this question.

15 marks

Suggested Books:

Balasubramanian, T. *A Textbook of English Phonetics for Indian Students*. Macmillan, 2012.

Bowden, John. *Writing a Report* 9th edition. How to Books, 2011.

Collins Cobuild English Grammar 4th edition. Harper Collins, 2017.

Hewings, Martin. *Advanced Grammar in Use* 2nd edition. CUP, 2005.

Oxford Advanced Learner's Dictionary (OALD) 10th edition, OUP, 2020.

Swan, Michael. *Practical English Usage* 4th edition. OUP, 2017.

Thompson, A.J. and A. V .Martinet. *A Practical English Grammar* 4th edition. OUP, 1997.

**Department of Computer Science & Applications
Maharshi Dayanand University, Rohtak**

Proposed Syllabus and Scheme of Examination

for

Undergraduate Course: B.Sc. Pass Course with Computer Science

Under

CHOICE BASED CREDIT SYSTEM (CBCS)

Submitted to

Maharshi Dayanand University, Rohtak
Academic Session 2020-21

**B.Sc. Pass Course With Computer Science
under Choice Based Credit System
Department of Computer Science**

Proposed Scheme of Examination

SEMESTER	COURSE OPTED	COURSE NAME	Credits	Marks	Internal Assessment	Total Marks
I	Ability Enhancement Compulsory Course-I	(English/ Hindi/ MIL Communication)/ Environmental Science	4	80	20	100
	Core Course-I (Theory) DSC 1A	Programming Methodologies	4	80	20	100
	Core Course-I (Practical) DSC 1A	Software Lab-I	2	50	-	50
	Core Course-II DSC 2A	DSC 2A	6(4+2)/ (5+1)	-	-	150
	Core Course-III DSC 3A	DSC 3A	6 (4+2)/ (5+1)	-	-	150
II	Ability Enhancement Compulsory Course-II	Environmental Science/ (English/ Hindi/ MIL Communication)	4	80	20	100
	Core Course-IV (Theory) DSC 1B	Data Structure	4	80	20	100
	Core Course-IV (Practical) DSC 1B	Software Lab-II	2	50	-	50
	Core Course-V DSC 2B	DSC 2B	6(4+2)/ (5+1)	-	-	150
	Core Course-VI DSC 3B	DSC 3B	6(4+2)/ (5+1)	-	-	150
III	Skill Enhancement Course -1 SEC-1	Management Information System	4	80	20	100
	Core Course-VII (Theory) DSC 1C	Operating Systems	4	80	20	100
	Core Course-VII (Practical) DSC 1C	Software Lab-III	2	50	-	50
	Core Course-VIII DSC 2C	DSC 2C	6(4+2)/ (5+1)	-	-	150
	Core Course-IX DSC 3C	DSC 3C	6(4+2)/ (5+1)	-	-	150
IV	Skill Enhancement Course -2 SEC-2	E-Commerce	4	80	20	100
	Core Course-X (Theory) DSC 1D	Database Management System (DBMS)	4	80	20	100
	Core Course-XI (Practical) DSC 1D	Software Lab-IV	2	50	-	50

	Core Course-XII DSC 2D	DSC 2D	6(4+2)/ (5+1)	-	-	150
	Core Course XII DSC 3D	DSC 3D	6(4+2)/ (5+1)	-	-	150
V	Skill Enhancement Course -3 SEC-3	Computer Network	4	80	20	100
	Discipline Specific Elective -1* (Theory) DSE-1A	DSE-1A* (List attached)	4	80	20	100
	Discipline Specific Elective -1* (Practical) DSE-1A	Software Lab V	2	50	-	50
	Discipline Specific Elective -2 DSC-2A	DSC-2A	6 (4+2)/ (5+1)	-	-	150
	Discipline Specific Elective -3 DSC-3A	DSC-3A	6 (4+2)/ (5+1)	-	-	150
VI	Skill Enhancement Course -4 SEC-4	Software Engineering	4	80	20	100
	Discipline Specific Elective -4* (Theory) DSE-1B	DSE-1B *(List attached)	4	80	20	100
	Discipline Specific Elective -4* (Practical) DSE-1B	Software Lab-VI	2	50	-	50
	Discipline Specific Elective -5 DSE-2B	DSE-2B	6 (4+2)/ (5+1)	-	-	150
	Discipline Specific Elective -6 DSE-3B	DSE-3B	6 (4+2)/ (5+1)	-	-	150

A. CORE COURSES

1. Programming Methodologies (4) + Software Lab-I (2)
2. Data Structure (4) + Software Lab-II (2)
3. Operating Systems (4) + Software Lab-III (2)
4. Database Management System (DBMS) (4) + Software Lab-IV (2)

B. DISCIPLINE SPECIFIC ELECTIVE COURSES

a) *Discipline Specific Elective-1 (DSE-1A) (Fifth Semester)

(Select any one of the three options)

1. Computer Organization and Architecture (4) + Software Lab-V (2)
2. Internet and Web Technologies (4) + Software Lab – V (2)
3. Object Oriented Programming using C++ (4) + Software Lab- V (2)

b) *Discipline Specific Elective-4 (DSE-1B) (Sixth Semester)

(Select any one of the three options)

1. Software Testing (4) + Software Lab – VI (2)
2. Artificial Intelligence (4) + Software Lab- VI (2)
3. Computer Graphics (4) + Software Lab-VI (2)

C. SKILL ENHANCEMENT COURSES

1. Management Information System
2. E-Commerce
3. Computer Networks
4. Software Engineering

Undergraduate Course: B. Sc. Pass Course with Computer Science

Program Objectives:

1. Effectively utilizing the knowledge of computing principles and mathematical theory to develop feasible solutions to current and future computing problems.
2. Develop the core set of technical skills that will prepare students for employment or further studies.
3. Identify and solve the most challenging computer science problems, and work towards developing new ideas and creating new knowledge in the field of Computer Science.
4. Understand the social context in which student's knowledge and work of Computer Science will be used, and engage in collaborative work with members of team outside the discipline.

Programme Outcomes: At the end of the program the students are able to:

- 1 Apply the knowledge of Science, Mathematics, and Computing to the solution of scientific problems.
- 2 An ability to identify, formulate, and develop solutions to computational challenges.
- 3 An ability to apply knowledge of computing appropriately to the discipline.
- 4 An ability to use appropriate techniques and skills necessary for computing practice.

Semester -1
Core Course-I
Programming Methodologies

Course Objectives:

1. Aware about fundamentals of computers and understand the concept and techniques of problem solving.
2. To learn the fundamentals of C language and familiar with programming environment.
3. Understand decision making and looping concept in C language.
4. Understand the concept of array, pointer, function, structure, union and file handling in C language.

Course Outcomes: At the end of the course the students are able to:

1. Demonstrate the basic knowledge of computer and formulate algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs in C language.
3. To test and execute the programs and correct syntax and logical errors.
4. Ability to apply solving and logical skills to programming in C language and other languages.

External Marks: 80

Internal Marks: 20

Credits: 4

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit-I

Computer Fundamentals: Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers.

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Techniques of Problem Solving: Flowcharting, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Unit-II

C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants, Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions. Managing Input and Output Operation: Formatted and Unformatted I/O Functions.

Unit-III

Decision making & Branching: Decision making with if statement, if-else statement, nested if, else-if ladder, switch statement, goto statement. Decision making & looping: for, while, and do-while loop; Jumps in loop, break, continue. Functions: Definition, prototype, passing parameters, Recursion.

Unit-IV

Arrays, Strings and Pointers: Definition, types, initialization, processing an array, passing arrays to functions, Array of Strings. String: String constant and variables, Declaration and initialization of string, Input/output of string data. Introduction to pointers: Declaration, operations on pointers, array of pointers, pointers to arrays. Structure & Unions. File Handling: Standard I/O text File, Writing to File, Reading a File.

Reference Books:

1. Gill Nasib Singh: Computing Fundamentals and Prog in C, Khanna Books Publishing Co., New Delhi.
2. Chhillar, Rajender Singh: Application of IT to Business, Ramesh Publishers, Jaipur.
3. P. K. Sinha & Priti Sinha, Computer Fundamentals, BPB Publications, 2007.
4. Gottfried: C Programming, Schaum's Outline Series, Tata McGraw-Hill Publishers.
5. Kanetkar: Let Us C, BPB Publications, New Delhi.
6. E. Balagurusamy: C Programming (Tata McGraw-Hill Publishers).

Core Course-I (Practical)
Software Lab-I
(C Language)

External Marks: 50
Credits: 2

Course Objectives:

- 1 Understand the basic concepts of C language and write programs using C language.
- 2 Learn the concept of operators and expressions in C language.
- 3 Understand the concept of conditional and looping in C language.
- 4 Understand the concept of functions, pointers, strings and files handling in C language.

Course Outcomes: At the end of the course the students are able to:

1. To translate the algorithms and flowchart to programs in C language.
2. Ability to apply solving and logical skills to programming in C language.
3. Write the programs using operators, expressions, conditional and looping statements, functions and pointers in C language.
4. To test and execute the programs and correct syntax and logical errors.

Note: 1. Practical questions to be given by the teacher concerned.

2. Max Marks: 50 (Practical + Viva-Voce)

3. Practical Examination Time – 3Hours

Semester -II
Core course-IV
Data Structure

Course Objectives:

1. To impart the basic concepts of data structures.
2. To understand concepts about array and link list.
3. Exploring basic data structures such as stacks queues and lists.
4. Introduces a variety of data structures such as tree and graphs.

Course Outcomes: At the end of the course the students are able to:

1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for array and link list.
4. Design programs using a variety of data structures, including binary and general tree structures and graphs.

External Marks: 80
Internal Marks: 20
Credits: 4

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I

Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space tradeoff, Big-O notation.

Strings: Introduction, Storing strings, String operations, Pattern matching algorithms.

UNIT – II

Arrays: Introduction, Linear arrays, Representation of linear array in memory, address calculations, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, Sparse arrays.

Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Threaded lists, Garbage collection, Applications of linked lists.

UNIT – III

Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of stacks: Polish notation, Recursion.

Queues: Introduction, Array and linked representation of queues, Operations on queues, Deques, Priority Queues, Applications of queues.

UNIT – IV

Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees: In order, Preorder & Post order, Applications of binary tree, Algorithm of tree traversal with and without recursion.

Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs, Traversing a graph, path matrix, Dijkstra's Algorithm, spanning tree, kurskal's algorithm and Prism algorithm.

Suggested Readings:

1. Lipschutz: Data Structures, Schaum's Outline Series, Tata McGraw-Hill.
2. Adam Drozdek: Data Structures and Algorithms in C++, Vikas Pub. House, New Delhi.
3. Gupta Amit: Data Structures Through C, Galgotia Booksource Pvt. Ltd., New Delhi.
4. Sofat S.: Data Structures With C and C++, Khanna Book Pub. Co.(P) Ltd, N. Delhi.
5. Dromey R.G: How to Solve it by Computer ?, Prentice Hall India.
6. Loomis: Data Structure and File Management, Prentice-Hall India Ltd.
7. Tannenbaum: Data Structure Using C, Tata McGraw-Hill.

Semester -II
Core Course-IV (Practical)
Software Lab –II (Data Structure using C)

External Marks: 50
Credits: 2

Course Objectives:

1. Understand the concept of dynamic memory management, data types, algorithms, Big O notation.
2. Understand basic data structures such as arrays, linked lists, stacks and queues.
3. Solve problem involving trees and graph
4. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

Course Outcomes: At the end of the course the students are able to:

1. To translate the traversing, insertion and deletion algorithms into C language.
2. Ability to apply various operations on stack and queue.
3. Ability to apply Algorithm of tree traversal with and without recursion.
4. To test and execute the programs and correct syntax and logical errors.

Note: 1. Practical questions to be given by the teacher concerned.

2. Max Marks: 50 (Practical + Viva –Voce)

3. Practical Examination Time – 3Hours

Choice Based Credit System (CBCS)

DEPARTMENT OF STATISTICS

UNDERGRADUATE PROGRAMME

(BA/B.Sc Pass Course)

(Courses effective from Academic Year 2020-21)



SYLLABUS OF COURSES TO BE OFFERED

(Core Courses, Elective Courses & Ability Enhancement Courses)

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.

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).

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 his own with an advisory support by a teacher/faculty member is called dissertation/project.

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.

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

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.

Details of Courses Under Undergraduate Programme (B.A./B.Sc.)

Course	*Credits
<hr/>	
	Theory+ Practical
I. <u>Core Course</u>	12X4= 48
(12 Papers)	
04 Courses from each of the	
03 disciplines of choice	
Core Course Practical / Tutorial*	12X2=24
(12 Practical/ Tutorials*)	
04 Courses from each of the	
03 Disciplines of choice	
II. <u>Elective Course (6 Credits)</u>	
(2 courses each of the discipline	
of choice including paper of interdisciplinary nature).	
Discipline Specific Elective (DSE)	
(6 Theory papers of 4 credits each)	6 X 4=24
(6 Practical's of 2 Credits each)	
Elective Course Practical / Tutorials*	6 X 2=12
(6 Practical / Tutorials*)	
	<hr/>
	Total 36 credits
	<hr/>
Two Papers from each discipline of choice	
including paper of interdisciplinary nature	
• Optional Dissertation or project work in place of one Discipline elective paper (6 credits)	
in 6th Semester	
III. <u>Ability Enhancement Courses</u>	
1. Ability Enhancement Compulsory	2 X 4=8
(2 Papers of 4 credits each)	
Environmental Science	
English/MIL Communication	
2. Skill Enhancement Course	
(Skill Based)	
(4 Papers of 3 credits each)	4 X 3=12
(4 Practical's of 1 credit each)	4 X 1= 4
	Total credit = 24
<hr/>	
Total credit	132
<hr/>	
Institute should evolve a system/policy about ECA/ General	
Interest/Hobby/Sports/NCC/NSS/related courses on its own.	

*wherever there is practical there will be no tutorials and vice -versa

Structures of Core Courses, Skill Enhancement Courses and Discipline Specific Elective Courses in B.A./ B.Sc. Program Statistics

Introduction

B.A./B.Sc. (General) Statistics program consists of 132 credits spread over six semesters. Each credit has one hour of class room teaching per week. This program emphasizes both theory and applications of Statistics and is structured to provide knowledge and skills in depth necessary for the employability of students in industry, other organizations, as well as in academics.

Program Specific Objectives:

To prepare graduates who are not only statistically sound but also capable of using their appropriate statistical skills in interdisciplinary areas such as finance, health, agriculture, government, business, industry, telecommunication, and bio-statistics. As a result, they can pursue their future career either in the core field or in the applied field of Statistics. The main program specific objectives are:

- To familiarize students with computational techniques and software used in the statistical arena.
- To provide a solid ground in the best practices of collating and disseminating information.
- To teach students to construct practical statistical models for several processes in the real world.
- To prepare students for undertaking further study.

Program Specific Outcomes:

- Demonstrate the ability to use skills in Statistics and different practicing areas for formulating and tackling Statistics related problems and identifying and applying appropriate principles and methodologies to solve a wide range of problems associated with Statistics.
- Acquire fundamental/systematic or coherent understanding of the academic field of Statistics and its different learning areas and applications.
- Plan and execute Statistical experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate statistical software including programming languages, and report accurately the findings of the experiment/investigations.

B.Sc. Pass Course under Choice Based Credit System
Department of Statistics

Proposed Scheme of Examination

SEMESTER	COURSE OPTED	COURSE NAME	Credits	Marks	Internal Assessment	Total Marks
I	Ability Enhancement Compulsory Course-I	(English/Hindi/MIL Communication)/ Environmental Science	4	80	20	100
	Core Course-I (Theory) DSC-IA	Descriptive Statistics	4	80	20	100
	Core Course-I (Practical) DSC-IA	Descriptive Statistics	2	50	-	50
	Core Course-II DSC 2A	DSC 2A	-	-	-	-
	Core Course-III DSC 3A	DSC 3A	-	-	-	-
II	Ability Enhancement Compulsory Course-II	Environmental Science (English/ Hindi/ MIL Communication)	4	80	20	100
	Core Course-IV (Theory) DSC 1B	Probability and Probability Distributions	4	80	20	100
	Core Course-IV (Practical) DSC 1B	Probability Distributions	2	50	-	50
	Core Course-V DSC 2B	DSC 2B	-	-	-	-
	Core Course-VI DSC 3B	DSC 3B	-	-	-	-
III	Skill Enhancement Course-1 SEC-1	Programming in C and Numerical Methods	4	80	20	100
	Core Course-VII (Theory) DSC 1C	Statistical Inference	4	80	20	100
	Core Course-VII (Practical) DSC 1C	Statistical Inference	2	50	-	50
	Core Course-VIII DSC 2C	DSC 2C	-	-	-	-
	Core Course-IX DSC 3C	DSC 3C	-	-	-	-
IV	Skill Enhancement Course-2 SEC-2	Data Analysis Using SPSS Software	4	80	20	100
	Core Course-X (Theory) DSC-1D	Sampling Techniques and Design of Experiments	4	80	20	100
	Core Course-X (Practical) DSC-1D	Sampling Techniques and Design of Experiments	2	50	-	50
	Core Course-XI DSC 2D	DSC 2D	-	-	-	-
	Core Course-XII DSC 3D	DSC 3D	-	-	-	-

V	Skill Enhancement Course-3 SEC-3	Data Analysis Using R Programming	4	80	20	100
	Discipline Specific Elective-1 DSE-1A	DSE-1A (Theory)*	4	80	20	100
		DSE-1A Practical's*	2	50	-	50
	Discipline Specific Elective -2 DSE-2A	DSE-2A	6 (4+2)/ (5+1)	-	-	150
Discipline Specific Elective-3 DSE-3A	DSE-3A	6 (4+2)	130	20	150	
VI	Skill Enhancement Course-4 SEC-4	Optimization Techniques	4	80	20	100
	Discipline Specific Elective -4 DSE-1B	DSE-1B (Theory)*	4	80	20	100
		DSE-1B Practical's*	2	50	-	50
	Discipline Specific Elective -5 DSE-2B	DSE-2B	6 (4+2)/ (5+1)	-	-	150
Discipline Specific Elective -6 DSE-3B	DSE-3B	6 (4+2)	130	20	150	

A. CORE COURSES

1. Descriptive Statistics (4) + Practical Based on Descriptive Statistics (2)
2. Probability and Probability Distributions (4)+ Practical Based on Probability Distributions (2)
3. Statistical Inference (4)+ Practical Based on Statistical Inference (2)
4. Sampling Techniques (4) Design of Experiments and Practical Based on Sampling Techniques and Design of Experiments (2)

B. DISCIPLINE SPECIFIC ELECTIVE COURSES*

a) Discipline Specific Elective (DSE)-1 (Fifth Semester)

(Select any one of the three options)

1. Parametric and Non Parametric Tests (4) + Practical Based on Parametric and Non Parametric Tests (2)
2. Vital Statistics (4) + Practical Based on Vital Statistics (2)
3. Statistical Methods (4)+ Practical Based on Statistical Methods (2)

b) Discipline Specific Elective (DSE)-4 (Sixth Semester)

(Select any one of the three options)

1. Operation Research (4)+ Practical Based on Operation Research (2)
2. Statistical Quality Control (4)+ Practical Based on Statistical Quality Control (2)
3. Numerical Methods (4)+ Practical Based on Numerical Methods (2)

C. SKILL ENHANCEMENT COURSES

1. Programming in C and Numerical Methods
2. Data Analysis Using SPSS Software
3. Data Analysis Using R Programming
4. Optimization Techniques

B.A Pass Course under Choice Based Credit System
Department of Statistics

Proposed Scheme of Examination

SEMESTER	COURSE OPTED	COURSE NAME	Credits	Marks	Internal Assessment	Total Marks
I	Ability Enhancement Compulsory Course-I	(English/Hindi/MIL Communication)/ Environmental Science	4	80	20	100
	Core Course-I DSC 1A	English/ Hindi/MIL	6 (5+1)	120	30	150
	Core Course-II (Theory) DSC 2A	Descriptive Statistics	4	80	20	100
	Core Course-II (Practical) DSC 2A	Descriptive Statistics	2	50	-	50
	Core Course-III DSC 3A	DSC 3A	6 (5+1)	120	30	150
II	Ability Enhancement Compulsory Course-II	Environmental Science/(English/ Hindi/MIL Communication)	4	80	20	100
	Core course-IV DSC 1B	English/Hindi/MIL	6 (5+1)	120	30	150
	Core course-V (Theory) DSC 2B	Probability and Probability Distributions	4	80	20	100
	Core Course-V (Practical) DSC 2B	Probability Distributions	2	50	-	50
	Core Course-VI DSC 3B	DSC 3B	6 (5+1)	120	30	150
III	Skill Enhancement Course -1 SEC-1	Programming in C and Numerical Methods	4	80	20	100
	Core Course-VII DSC 1C	English/ Hindi/MIL	6 (5+1)	120	30	150
	Core Course-VIII (Theory) DSC 2C	Statistical Inference	4	80	20	100
	Core Course-VIII (Practical) DSC 3C	Statistical Inference	2	50	-	50
	Core Course-IX DSC 3C	DSC 3C	6 (5+1)	120	30	150
IV	Skill Enhancement Course -2 SEC-2	Data Analysis Using SPSS Software	4	80	20	100
	Core course-X DSC 1D	English/ Hindi/ MIL	6 (5+1)	120	30	150
	Core Course-XI (Theory) DSC 2D	Sampling Techniques and Design of Experiments	4	80	20	100
	Core Course-XI (Practical)	Sampling Techniques and	2	50	-	50

	DSC 2D	Design of Experiments				
V	Skill Enhancement Course -3 SEC-3	Data Analysis Using R Programming	4	80	20	100
	Generic Elective -1 GE-1	Vital Statistics/ Actuarial Statistics	6 (5+1)	120	30	150
	Discipline Specific Elective -1 DSE-1	DSE-1	6 (5+1)	120	30	150
	Discipline Specific Elective – 2 DSE-2	DSE-2 (Theory)*	4	80	20	100
		DSE-2 Practical's*	2	50	-	50
VI	Skill Enhancement Course -4 SEC-4	Optimization Techniques	4	80	20	100
	Generic Elective – 2 GE-2	Agricultural Statistics / Clinical Trials	6 (5+1)	120	30	150
	Discipline Specific Elective -3 DSE-3	DSE-3	6 (5+1)	120	30	150
	Discipline Specific Elective – 4 DSE-4	DSE-4 (Theory)*	4	80	20	100
		DSE-4 Practical's*	2	50	-	50

A. CORE COURSES

1. Descriptive Statistics (4)+ Practical's Based on Descriptive Statistics (2)
2. Probability and Probability Distributions (4)+ Practical's Based on Probability Distributions (2)
3. Statistical Inference (4)+ Practical's Based on Statistical Inference (2)
4. Sampling Techniques and Design of Experiments (4)+ Practical's Based on Sampling Techniques and Design of Experiments (2)

B. DISCIPLINE SPECIFIC ELECTIVE COURSES*

a) Discipline Specific Elective (DSE)-2 (Fifth Semester)

(Select any one of the three options)

1. Parametric and Non Parametric Tests (4) + Practical Based on Parametric and Non Parametric Tests (2)
2. Applied Statistics (4) + Practical Based on Applied Statistics (2)
3. Statistical Methods (4)+ Practical Based on Statistical Methods (2)

b) Discipline Specific Elective (DSE)-4 (Sixth Semester)*

(Select any one of the three options)

1. Operation Research (4)+ Practical Based on Operation Research (2)
2. Statistical Quality Control (4)+ Practical Based on Statistical Quality Control (2)
3. Numerical Methods (4)+ Practical Based on Numerical Methods (2)

C. GENERIC ELECTIVE COURSES

Fifth Semester (Select any one of the two options)

1. Vital Statistics
2. Actuarial Statistics

Sixth Semester (Select any one of the two options)

1. Agricultural Statistics
2. Clinical Trials

D. SKILL ENHANCEMENT COURSES

1. Programming in C and Numerical Methods
2. Data Analysis Using SPSS Software
3. Data Analysis Using R Programming
4. Optimization Techniques

ST-DSC I*: Descriptive Statistics

B.A./ B.Sc.- 80+20 (I.A.)

Credits: 04

Time Allowed: 3 hours

Paper Code:

Paper: Descriptive Statistics

Course outcomes:

Students will acquire

- Knowledge of Statistics and its scope and importance in various areas.
- Information about various Statistical organizations in India and their functions for societal developments,
- Knowledge of various types of data, measures of central tendency and dispersion etc.
- Knowledge of independence and association between two attributes,
- Knowledge of correlation, regression analysis, regression diagnostics, partial and multiple correlations.

Unit I

Introduction to Statistics. Meaning and Importance of Statistics. Scope of Statistics in Industry, Biological Sciences, Medical Sciences, Economics, Social Sciences, Management Sciences, Agriculture, Insurance, Information technology, Education and Psychology. Statistical organizations in India and their functions: CSO, ISI, NSS, IIPS (Devnar, Mumbai), Bureau of Economics and Statistics.

Unit II

Population and Sample. Variables: Interval Scale, Ratio Scale, Discrete and Continuous Variables, Difference between Linear Scale and Circular Scale. Primary and Secondary Data, Cross-Sectional Data, Time Series Data, Directional Data. Notion of a Statistical Population: Finite Population, Infinite Population, Homogeneous Population and Heterogeneous Population. Notion of a Sample and a Random Sample. Summary Statistics, Review/ Revision of Presentation of Data

Unit III

Classification: Raw Data and its Classification, Ungrouped Frequency Distribution, Sturges' Rule, Grouped Frequency Distribution, Cumulative Frequency Distribution, Inclusive and Exclusive Methods of Classification, Open end Classes, and Relative Frequency Distribution. Measures of Central Tendency. Partition Values: Quartiles, Deciles and Percentiles (for Ungrouped and Grouped Data), Box Plot, Measures of Dispersion, Moments, Skewness and Kurtosis

Unit IV

Bivariate Data: Scatter Diagram, Product Moment Correlation Coefficient and its Properties, Coefficient of Determination, Correlation Ratio, Rank Correlation, Interclass Correlation, Concept of Error in Regression, Residuals, Principle of Least Squares, Fitting of Linear Regression and Related Results, Regression Diagnostics. Partial and Multiple Correlation in Three Variables, their Measures and Related Results. Theory of Attributes: Independence and Association of Attributes, Various Measures of Association for Two Way Classified Data

Books Suggested:

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamentals of Statistics, Vol-I, World Press, Kolkata
2. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamentals of Statistics, Vol-II, World Press, Kolkata
3. Miller, I. and Miller, M. (2006). John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia
4. Mood, A.M. Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory of Statistics, 3rd Edn., Tata McGraw-Hill Pub. Co. Ltd.

Note: * The syllabi for ST-DSC-III Paper for B.A. Programme will be same as that of ST-DSC-I Paper for B.Sc. Programme

Paper Code:
B.Sc. I - Semester-I
ST-DSC I*: Practical Based on Descriptive Statistics

Maximum Marks - 50

Credits: 02

Time Allowed: 3 hours

LIST OF PRACTICALS:

1. Diagrammatic Representation of Statistical Data Problems Based on Simple and Subdivided Bar Diagrams, Pie Diagram.
2. Graphical Representation of Statistical Data.
3. Computation of measures of Central Tendency and Dispersion. Use of an appropriate measure and Interpretation of results.
4. Moments, Measures of Skewness and Kurtosis, Box Plot
5. Consistency of Data up to 2 Attributes. Concepts of Independence and Association of two Attributes.
6. Yule's Coefficient of Association (Q)
7. Bivariate Data: Scatter Diagram, Plotting and Interpretation
8. Calculation of Product Moment Correlation Coefficient, Correlation Ratio, Rank Correlation
9. Calculation of Regression Coefficients
10. Fitting of Regression Lines by Least Squares
11. Calculation of Partial and Multiple Correlation Coefficients for Three Variables.

Note: * The syllabi for ST-DSC-III Practical Paper for B.A. Programme will be same as that of ST-DSC-I Practical Paper for B.Sc. Programme

Paper Code:
B.Sc. I - Semester-II
ST-DSC IV*: Probability and Probability Distributions

B.A./ B.Sc.- 80+20 (I.A.)

Credits: 04

Time Allowed: 3 hours

Paper Code:

Paper: Probability and Probability Distributions

Course Outcomes:

- Provided a base to understand fundamentals of Statistics.
- Acquired knowledge about random variables, probability mass function and density function.
- Achieved knowledge to understand Probability Distributions.

Unit-I

Random experiment, sample point and sample space, event, algebra of events, Definition of Probability - classical, relative frequency and axiomatic approaches to probability, merits and demerits of these approaches (only general ideas to be given). Theorem on probability, conditional probability, independent events. Baye's theorem and its applications

Unit-II

Random variables: Discrete and continuous random variables, p.m.f., p.d.f. and c.d.f., illustrations of random variables and its properties, expectation of random variable and its properties. Moments and cumulants, moment generating function, cumulants generating function and characteristic function

Unit-III

Bivariate probability distributions, marginal and conditional distributions; independence of variates (only general idea to be given). Transformation in univariate and bivariate distributions. Discrete probability distributions: Binomial, Poisson, Geometric, Negative Binomial, Hypergeometric, Uniform

Unit-IV

Continuous Probability Distributions: normal, exponential, Cauchy, beta and gamma along with their properties and limiting / approximation cases.

Books Suggested:

1. Goon, A.M., Gupta, M.K., and B. Das Gupta: Fundamentals of Statistics, Vol-I.
2. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi
3. Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi

Note: * The syllabi for ST-DSC-VI Paper for B.A. Programme will be same as that of ST-DSC-IV Paper for B.Sc. Programme

Paper Code:
B.Sc. I - Semester-II
ST-DSC IV*: Practical Based on Probability Distributions

Maximum Marks - 50
Credits: 02
Time Allowed: 3 hours

LIST OF PRACTICALS:

1. Fitting of Binomial Distributions for n and $p = q = \frac{1}{2}$ and for n and p given.
2. Fitting of Binomial Distributions by Computing Mean and Variance
3. Fitting of Poisson Distributions for give n and λ and after Estimating Mean.
4. Fitting of Negative Binomial
5. Application Problems Based on Binomial Distribution
6. Application Problems Based on Poisson Distribution
7. Application Problems Based on Negative Binomial Distribution
8. Problems Based on Area Property of Normal Distribution
9. Application Based Problems Based on Normal Distribution
10. Fitting of Normal Distribution when Parameters are given/ not given.

Note: * The syllabi for ST-DSC-III Practical Paper for B.A. Programme will be same as that of ST-DSC-IV Practical Paper for B.Sc. Programme