

# **FACULTY OF ENGINEERING & TECHNOLOGY**

## **SYLLABUS**

### **FOR**

## **BACHELOR OF COMPUTER APPLICATIONS (Semester: I–VI)**

**Session: 2019-20**



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## **GURU NANAK DEV UNIVERSITY AMRITSAR**

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- (ii) **Subject to change in the syllabi at any time.**  
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**SCHEME****SEMESTER – I:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper – I	Introduction to Programming – C	75
Paper – II	Introduction to Computers and Information Technology	75
Paper – III	Applied & Discrete Mathematics	75
Paper – IV	Practical–I (MS Office 2010 and Basic C Programming)	75
Paper – V	Communication Skills in English – I	50
Paper – VI	Punjabi (Compulsory) / ** ਮੁੱਢਲੀ ਪੰਜਾਬੀ / ** Punjab History & Culture (From Earliest Times to C 320)	50
Paper – VII	* Drug Abuse: Problem, Management and Prevention (Compulsory Paper)	50

**SEMESTER – II:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper – I	Introduction to Programming – C ++	75
Paper – II	Principles of Digital Electronics	75
Paper – III	Numerical Methods & Statistical Techniques	75
Paper – IV	Practical – I (Advanced C++ Programming)	75
Paper – V	Communication Skills in English – II (Th.35+Pr.15)	50
Paper – VI	Punjabi (Compulsory) / ** ਮੁੱਢਲੀ ਪੰਜਾਬੀ / ** Punjab History & Culture (C 320 TO 1000 B.C.)	50
Paper – VII	* Drug Abuse: Problem, Management and Prevention (Compulsory Paper)	50

**Note: \* Marks of this Paper will not be included in the Total Marks.**

**\*\* (Special Paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**

**SEMESTER – III:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper-I	Computer Architecture	75
Paper-II	Database Management System	75
Paper-III	Introduction to Python Programming	75
Paper-IV	Programming Lab – Python	50
Paper-V	Programming Lab – Oracle	25

**SEMESTER – IV:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper – I	Data Structure & File Processing	75
Paper – II	Information Systems	75
Paper – III	Internet Applications	75
Paper – IV	System Software	75
Paper – V	Lab – Data Structures Implementation using C++	50
Paper – VI	Lab – Web Designing and use of Internet	50
Paper – VII (ESL-221)	* Environmental Studies (Compulsory)	100

**\* Marks of Paper EVS will not be included in Grand Total.**

**SEMESTER – V:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper – I	Computer Networks	75
Paper – II	Web Technologies	75
Paper – III	Operating System	75
Paper – IV	JAVA Programming Language	75
Paper – V	Lab based on JAVA Programming Language	50
Paper – VI	Lab based on ASP.NET	50

**SEMESTER – VI:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper – I	Computer Graphics	75
Paper – II	Software Engineering	75
Paper – III	Lab. Implementation of Applications of Computer Graphics in C++/C	50
Paper – IV	Project	200

**Paper–I: INTRODUCTION TO PROGRAMMING - C****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section – A**

**Fundamentals:** Character set, Identifiers and Key Words, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants.

**Operations and Expressions:** Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators, Library functions. Data Input and Output statements

**Section – B**

**Control Statements:** Preliminaries, While, Do–while and For statements, Nested loops, If–else, Switch, Break – Continue statements.

**Program Structure Storage Class:** Automatic, external and static variables, multiple programs, more about library functions.

**Section – C**

**Functions:** Brief overview, defining, accessing functions, passing arguments to function, specifying argument data types, function prototypes, recursion.

**Arrays:** Defining, processing an array, passing arrays to a function, multi–dimensional arrays.

**Strings:** String declaration, string functions and string manipulation

**Section – D**

**Structures & Unions:** Defining and processing a structure, user defined data types, structures and pointers, passing structures to functions, self-referenced structure, unions.

**Pointers:** Fundamentals, pointer declaration, passing pointer to a function, pointer and one dimensional arrays, operation on pointers, pointers & multi–dimensional arrays of pointers, passing functions, other functions, more about pointer declarations.

**References:**

1. Balaguruswamy: “Programming in ANSIC”.
2. Scaum Outline Series: “Programming in C”.
3. Dennis & Ritchie: “Programming in C”.
4. Stephen G. Kochar: “C Programming”.

**Paper–II: INTRODUCTION TO COMPUTERS AND INFORMATION TECHNOLOGY****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A****Introduction to Computers and its Applications:**

- Computer as a system, basic concepts, functional units and their inter relation.
- Milestones in Hardware and Software.
- Batch oriented / on–line / real time applications.
- Application of computers.

**SECTION–B****Interacting with the Computer:**

**Input Devices:** Keyboard, mouse, pens, touch screens, Bar Code reader, joystick, source data automation, (MICR, OMR, OCR), screen assisted data entry: portable / handheld terminals for data collection, vision input systems.

**Output Devices:** Monitor, Serial line page printers, plotters, voice response units.

**SECTION–C**

**Data Storage Devices and Media:** Primary storage (Storage addresses and capacity, type of memory), Secondary storage, Magnetic storage devices and Optical Storage Devices

**Word Processor using Microsoft Office:** Overview, creating, saving, opening, importing, exporting and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. Headings, styles, fonts and font size Editing, positioning and viewing texts, Finding and replacing text, inserting page breaks, page numbers, book marks, symbols and dates. Using tabs and tables, header, footer and printing

**SECTION–D**

**Presentation Software using Microsoft Office:** Presentation overview, entering information, Presentation creation, opening and saving presentation, inserting audio and video

**Spreadsheet using Microsoft Office:** Spreadsheet overview, Editing, Formatting, Creating formulas, Graphs.

**Text/References:**

1. Computer Fundamentals – P.K. Sinha.
2. Introduction to Computers – N. Subramanian.
3. Introduction to Computers – Peter Norton Mcgraw Hill.
4. MS–Office – BPB Publications.
5. Windows Based Computer Courses – Gurvinder Singh & Rachpal Singh, Kalyani Pub.
6. Ebooks at OpenOffice.org
7. A Conceptual Guide to OpenOffice.org3, 2<sup>nd</sup> Edition, R. Gabriel Gurley

**Paper III: APPLIED & DISCRETE MATHEMATICS****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A**

**Sets and Relations:** Definition of sets, subsets, complement of a set, universal set, intersection and union of sets, De-Morgan's laws, Cartesian products, Equivalent sets, Countable and uncountable sets, minset, Partitions of sets, Relations: Basic definitions, graphs of relations, properties of relations

**SECTION–B**

**Logic and Propositional Calculus:** Proposition and Compound Propositions, basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Duality law, Algebra of propositions, Conditional and Bi conditional Statements, Arguments, Logical Implication, Propositional Functions, Predicates and Quantifiers, Negation of Quantified Statements, Inference theory of the predicates calculus.

**SECTION–C**

**Boolean Algebra:** Boolean algebra and its duality, Duality, Boolean Algebra as Lattices, Boolean identities, sub-algebra, Representation Theorem, Sum-of-Products Form for Sets, Sum of-Products Form for Boolean Algebra, Minimal Boolean Expressions, Prime Implicants, Boolean Functions, Karnaugh Maps.

**SECTION–D**

**Matrices:** Introduction of a Matrix, its different kinds, matrix addition and scalar multiplication, multiplication of matrices, transpose etc. Square matrices, inverse and rank of a square matrix, Matrix Inversion method.

**References:**

1. Lipschutz, S. and Lipson, M.: Discrete Mathematics (Schaum's outlines Series).
2. Kolman and Busby "Discrete Mathematical structures for Computer Sciences" PHI.
3. Alan Doerr, "Applied Discrete Structures for Computer Science", Galgotia Publications.
4. Trambley, J.P. and Manohar,R: Discrete Mathematical Structures with Applications to Computer Science.

**Paper – IV: Practical – I**  
**(MS Office 2010 & Basic C Programming)****M. Marks: 75****Operational Knowledge of:**

1. C Programming
2. Windows Based Operating System
3. MS – OFFICE (Word and Power Point)



**PAPER–V: COMMUNICATION SKILLS IN ENGLISH – I****Time: 3 Hours****Max. Marks: 50****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**The syllabus is divided in four sections as mentioned below:**

**Section–A**

**Reading Skills:** Reading Tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings.

**Section–B**

Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

**Activities:**

- Comprehension questions in multiple choice format
- Short comprehension questions based on content and development of ideas

**Section–C**

**Writing Skills:** Guidelines for effective writing; writing styles for application, personal letter, official/ business letter.

**Activities:**

- Formatting personal and business letters.
- Organising the details in a sequential order

**Section–D**

Resume, memo, notices etc.; outline and revision.

**Activities:**

- Converting a biographical note into a sequenced resume or vice-versa
- Ordering and sub-dividing the contents while making notes.
- Writing notices for circulation/ boards

**Recommended Books:**

- *Oxford Guide to Effective Writing and Speaking* by John Seely.
- *English Grammar in Use* (Fourth Edition) by Raymond Murphy, CUP

**PAPER-VI: ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)**

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

**ਸੈਕਸ਼ਨ-ਏ**

ਆਤਮ ਅਨਾਤਮ (ਕਵਿਤਾ ਭਾਗ),  
(ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)  
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।  
(ਪ੍ਰਸ਼ੰਸਾ ਸਹਿਤ ਵਿਆਖਿਆ, ਸਾਰ )

**ਸੈਕਸ਼ਨ-ਬੀ**

ਇਤਿਹਾਸਕ ਯਾਦਾਂ (ਇਤਿਹਾਸਕ ਲੇਖ-ਸੰਗ੍ਰਹਿ)  
ਸੰਪਾ. ਸ.ਸ.ਅਮੋਲ,  
ਪੰਜਾਬੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ। (ਲੇਖ 1 ਤੋਂ 6)  
(ਨਿਬੰਧ ਦਾ ਸਾਰ, ਲਿਖਣ-ਸ਼ੈਲੀ)

**ਸੈਕਸ਼ਨ-ਸੀ**

(ੳ) ਪੈਰੂਾ ਰਚਨਾ  
(ਅ) ਪੈਰੂਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ।

**ਸੈਕਸ਼ਨ-ਡੀ**

(ੳ) ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ : ਉਚਾਰਨ ਅੰਗ, ਉਚਾਰਨ ਸਥਾਨ ਤੇ ਵਿਧੀਆਂ, ਸਵਰ, ਵਿਅੰਜਨ,  
ਸੁਰ-ਪ੍ਰਕਾਸ਼।  
(ਅ) ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ : ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪ-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ, ਪੰਜਾਬੀ  
ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ।

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ**

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿੱਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿੱਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ।  
ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ  
ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

**PAPER–VI: ਮੁੱਢਲੀ ਪੰਜਾਬੀ**

(In lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ: 50

**ਪਾਠ-ਕ੍ਰਮ****ਸੈਕਸ਼ਨ-ਏ**

ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ, ਪੈਰ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ ਅਤੇ ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ ਅਤੇ ਮਾਤ੍ਰਵਾਂ (ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ)  
ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ

**ਸੈਕਸ਼ਨ-ਬੀ**

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ  
(ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ, ਮੂਲ ਸ਼ਬਦ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ)

**ਸੈਕਸ਼ਨ-ਸੀ**

ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਰਿਸ਼ਤੇ-ਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧੰਦਿਆਂ ਆਦਿ ਨਾਲ ਸੰਬੰਧਤ।

**ਸੈਕਸ਼ਨ-ਡੀ**

ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ**

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ।  
ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

**PAPER–VI: Punjab History & Culture (From Earliest Times to C 320)**

**(Special Paper in lieu of Punjabi Compulsory)  
(For those students who are not domicile of Punjab)**

**Time: 3 Hours****Max. Marks: 50****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section–A**

1. Physical features of the Punjab and its impact on history.
2. Sources of the ancient history of Punjab

**Section–B**

3. Harappan Civilization: Town planning; social, economic and religious life of the Indus Valley People.
4. The Indo-Aryans: Original home and settlements in Punjab.

**Section–C**

5. Social, Religious and Economic life during *Rig Vedic Age*.
6. Social, Religious and Economic life during *Later Vedic Age*.

**Section–D**

7. Teachings and impact of Buddhism
8. Jainism in the Punjab

**Suggested Readings:**

1. L. M Joshi (Ed.), *History and Culture of the Punjab*, Art-I, Patiala, 1989 (3<sup>rd</sup> Edition)
2. L.M. Joshi and Fauja Singh (Ed.), *History of Punjab*, Vol. I, Patiala 1977.
3. Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.
4. B.N. Sharma, *Life in Northern India*, Delhi. 1966.
5. Chopra, P.N., Puri, B.N., & Das, M.N. (1974). *A Social, Cultural & Economic History of India*, Vol. I, New Delhi: Macmillan India.

**PAPER – VII: DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION  
(COMPULSORY PAPER)****PROBLEM OF DRUG ABUSE****Time: 3 Hours****Max. Marks: 50****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section – A****Meaning of Drug Abuse:**

Meaning, Nature and Extent of Drug Abuse in India and Punjab.

**Section – B****Consequences of Drug Abuse for:**

- |            |   |                                |
|------------|---|--------------------------------|
| Individual | : | Education, Employment, Income. |
| Family     | : | Violence.                      |
| Society    | : | Crime.                         |
| Nation     | : | Law and Order problem.         |

**Section – C****Management of Drug Abuse:**

Medical Management: Medication for treatment and to reduce withdrawal effects.

**Section – D**

Psychiatric Management: Counselling, Behavioural and Cognitive therapy.

Social Management: Family, Group therapy and Environmental Intervention.

**References:**

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection*. Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug epidemic among Indian Youth*, New Delhi: Mittal Pub.
5. Kessel, Neil and Henry Walton. 1982, *Alcoholism*. Harmond Worth: Penguin Books.
6. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
7. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
8. Ross Coomber and Others. 2013, *Key Concept in Drugs and Society*. New Delhi: Sage Publications.
9. Sain, Bhim 1991, *Drug Addiction Alcoholism, Smoking obscenity* New Delhi: Mittal Publications.
10. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab: A Sociological Study*. Amritsar: Guru Nanak Dev University.
11. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
12. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation*, Cambridge University Press.
13. Verma, P.S. 2017, “*Punjab’s Drug Problem: Contours and Characteristics*”, Economic and Political Weekly, Vol. LII, No. 3, P.P. 40-43.
14. World Drug Report 2016, United Nations office of Drug and Crime.
15. World Drug Report 2017, United Nations office of Drug and Crime.

**Paper–I: INTRODUCTION TO PROGRAMMING - C++****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section–A**

**Programming Paradigms:** Introduction to the object oriented approach towards programming by discussing Traditional, Structured Programming methodology.

**Objects & Classes:** Object Definition, Instance, Encapsulation, Data Hiding, Abstraction, Inheritance, Messages, Method, Polymorphism, Classes, Candidate & Abstract Classes to be examples of the Design process.

**Section–B**

**Object Oriented Programming using C++:** Characteristics of OOP, Overview of C++, I/O using cout and cin, Objects and Classes, Member functions and data, private & public, constructor & destructor, Constructor Overloading, Types of Constructors.

**Section–C**

**Function Overloading:** Function Overloading, Default Arguments, Ambiguity in Function Overloading.

**Operator Overloading:** Overloading unary and binary operators, Type Conversion using Operator Overloading

**Section–D**

**Inheritance:** Concept of inheritance, Base & derived classes, Access Specifiers, Class Hierarchies, Types of Inheritance with examples.

**Virtual Functions and Polymorphism:** Virtual functions, friend functions, static function, this pointer, polymorphism, Types of Polymorphism with examples, templates, class templates.

**Books:**

1. Teach Yourself C++, Herbert Schildt, Tata McGraw Hill.
2. Designing Object Oriented Software Rebeca Wirfs - Brock Brian Wilerson, PHI.
3. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Publication.
4. Designing Object Oriented Applications using C++ & Booch Method, Robert C. Martin.

**Paper–II: PRINCIPLES OF DIGITAL ELECTRONICS****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A**

**Number System:** Introduction, number conversion system , binary arithmetic, representation of signed binary numbers, 1's and 2's complement, Codes: straight binary code, BCD Code Excess3 Code, Grey Code ASCII, Integer and floating point representation

**SECTION–B**

**Logic Gates and Boolean Algebra:** Logic gates, Universal Gates, Boolean algebra and Minimization techniques, canonical forms of Boolean expressions, K-Map

**SECTION–C**

**Combinational Circuits:** Adder, Subtractor, Multiplexer, Demultiplexer, Decoder, Encoder

**Sequential Circuits:** Flip-flops, clocks and timers, registers, counter

**SECTION–D**

**Semiconductor memories:** Introduction, Static and dynamic devices, read only & random access memory chips, PROMS and EPROMS Address selection logic. Read and write control timing diagrams for ICs

**References:**

1. Integrated Electronics by Millman, Halkias McGraw Hill.
2. Malvino: Digital Computer Electronics, McGraw Hill.
3. D.A. Hodges & H.G. Jackson, Analysis and Design of Integrated Circuits, International, 1983.
4. Joph. F. Wakerley, Digital Principles and Practices.
5. Ujjenbeck, John: Digital Electronics: A Modern Approach, Prentice Hall, 1994.
6. Mano, M. Morris: Digital Logic and Computer Design, Edition, 1993.



**Paper–III: NUMERICAL METHODS & STATISTICAL TECHNIQUES****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

- I. That the program for numerical and statistical methods are to be written in C.
- II. Paper setter indicating thereby that the greater weightage is to be given to exercises rather than theoretical derivation of all numerical and statistical methods.

**Note for Candidate:**

Attempt five questions in all by selecting one question from each section and the fifth question may be attempted from any sections. The students can use only Non-programmable & Non-storage type calculator.

**SECTION–A****Introduction:**

1. Numerical Methods, Numerical methods versus numerical analysis, Errors and Measures of Errors.
2. Non-linear Equations, Iterative Solutions, Multiple roots and other difficulties, Interpolation methods, Methods of bi-section, False position method, Newton Raphson – Method.
3. Simultaneous Solution of Equations, Gauss Elimination Method Gauss Jordan Method.

**SECTION–B**

1. Numerical Integration and different Trapezoidal Rule, Simpson's 3/8 Rule.
2. Interpolation and Curve Fitting, Lagrangian Polynomials, Newton's Methods: Forward Difference Method, Backward Difference Method Divided Difference Method.

**SECTION–C****Statistical Techniques:**

1. Measure of Central Tendency, Mean Arithmetic, Mean geometric, Mean harmonic, Mean, Median, Mode.
2. Measures of dispersion, Mean deviation, Standard deviation, Co-efficient of variation.
3. Correlation.

**SECTION–D**

1. Least square fit linear trend, Non-linear trend.

$$Y = ax^b$$

$$Y = ab^x$$

$$Y = ae^x$$

$$\text{Polynomial fit: } Y = a+bx+cn^2$$

**Books Recommended:**

1. V. Rajaraman: Computer Oriented Numerical Methods, Prentice Hall of India Private Ltd., New Delhi.
2. B.S. Grewal, Numerical Methods for Engineering, Sultan Chand Publication.

**Paper – IV: Practical–I**

**(Advanced C++ Programming)**

**M. Marks: 75**

Operational Knowledge and Implementation of Numerical Methods & Statistical techniques using C++ language.

**PAPER-V: COMMUNICATION SKILLS IN ENGLISH – II****Time: 3 Hours****Max. Marks: 50  
Theory Marks: 35  
Practical Marks: 15****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Course Contents:****SECTION-A**

**Listening Skills:** Barriers to listening; effective listening skills; feedback skills.

**Activities:** Listening exercises – Listening to conversation, News and TV reports

**SECTION-B**

Attending telephone calls; note taking and note making.

**Activities:** Taking notes on a speech/lecture

**SECTION-C**

**Speaking and Conversational Skills:** Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics.

**Activities:** 1) Making conversation and taking turns

2) Oral description or explanation of a common object, situation or concept

**SECTION-D**

The study of sounds of English,  
Stress and Intonation,  
Situation based Conversation in English,  
Essentials of Spoken English.

**Activities:** Giving Interviews

**PRACTICAL / ORAL TESTING****Marks: 15****Course Contents:-**

1. Oral Presentation with/without audio visual aids.
2. Group Discussion.
3. Listening to any recorded or live material and asking oral questions for listening comprehension.

**Questions:-**

1. Oral Presentation will be of 5 to 10 minutes duration (Topic can be given in advance or it can be student's own choice). Use of audio visual aids is desirable.
2. Group discussion comprising 8 to 10 students on a familiar topic. Time for each group will be 15 to 20 minutes.

**Note:** Oral test will be conducted by external examiner with the help of internal examiner.

**PAPER–VI: ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)**

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ : 50

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

**ਸੈਕਸ਼ਨ-ਏ**

ਆਤਮ ਅਨਾਤਮ (ਕਹਾਣੀ ਭਾਗ),  
(ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)  
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।  
(ਵਿਸ਼ਾ-ਵਸਤੂ, ਪਾਤਰ ਚਿਤਰਨ)

**ਸੈਕਸ਼ਨ-ਬੀ**

ਇਤਿਹਾਸਕ ਯਾਦਾਂ (ਇਤਿਹਾਸਕ ਲੇਖ-ਸੰਗ੍ਰਹਿ)  
ਸੰਪਾ. ਸ.ਸ.ਅਮੋਲ,  
ਪੰਜਾਬੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ। (ਲੇਖ 7 ਤੋਂ 12)  
(ਸਾਰ, ਲਿਖਣ ਸ਼ੈਲੀ)

**ਸੈਕਸ਼ਨ-ਸੀ**

(ੳ) ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ : ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ  
(ਅ) ਸ਼ਬਦ ਸੂਚੀ

**ਸੈਕਸ਼ਨ-ਡੀ**

(ੳ) ਸੰਖੇਪ ਰਚਨਾ  
(ਅ) ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ**

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿੱਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿੱਚੋਂ ਇੱਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿੱਚ ਕਰ ਸਕਦਾ ਹੈ।

**PAPER-VI: ਮੁੱਢਲੀ ਪੰਜਾਬੀ**  
(In lieu of Compulsory Punjabi)

ਸਮਾਂ: 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ: 50

ਪਾਠ-ਕ੍ਰਮ

ਸੈਕਸ਼ਨ-ਏ

ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ

(ਨਾਂਵ, ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ ਅਤੇ ਵਿਸਮਿਕ)

ਸੈਕਸ਼ਨ-ਬੀ

ਪੰਜਾਬੀ ਵਾਕ ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ

(ੳ) ਸਾਧਾਰਨ ਵਾਕ, ਸੰਯੁਕਤ ਵਾਕ ਅਤੇ ਮਿਸ਼ਰਤ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

(ਅ) ਬਿਆਨੀਆ ਵਾਕ, ਪ੍ਰਸ਼ਨਵਾਚਕ ਵਾਕ ਅਤੇ ਹੁਕਮੀ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

ਸੈਕਸ਼ਨ-ਸੀ

ਪੈਰ੍ਰਾ ਰਚਨਾ

ਸੰਖੇਪ ਰਚਨਾ

ਸੈਕਸ਼ਨ-ਡੀ

ਚਿੱਠੀ ਪੱਤਰ (ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ)

ਅਖਾਣ ਅਤੇ ਮੁਹਾਵਰੇ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ।  
ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

**PAPER–VI: Punjab History & Culture (C 320 to 1000 B.C.)**  
**(Special Paper in lieu of Punjabi compulsory)**  
**(For those students who are not domicile of Punjab)**

**Time: 3 Hours**

**Max. Marks: 50**

**Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section–A**

1. Alexander's Invasion and its Impact
2. Punjab under Chandragupta Maurya and Ashoka.

**Section–B**

3. The Kushans and their Contribution to the Punjab.
4. The Panjab under the Gupta Empire.

**Section–C**

5. The Punjab under the Vardhana Emperors
6. Socio-cultural History of Punjab from 7<sup>th</sup> to 1000 A.D.

**Section–D**

7. Development of languages and Education with Special reference to Taxila
8. Development of Art & Architecture

**Suggested Readings:**

1. L. M Joshi (Ed), *History and Culture of the Punjab*, Art-I, Punjabi University, Patiala, 1989 (3<sup>rd</sup> Edition)
2. L.M. Joshi and Fauja Singh (Ed.), *History of Punjab*, Vol. I, Punjabi University, Patiala, 1977.
3. Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.
4. B.N. Sharma: *Life in Northern India*, Delhi. 1966.

**PAPER – VII: DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION  
(COMPULSORY PAPER)****DRUG ABUSE: MANAGEMENT AND PREVENTION****Time: 3 Hours****Max. Marks: 50****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section – A****Prevention of Drug abuse:**

Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.

**Section – B**

School: Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.

**Section – C****Controlling Drug Abuse:**

Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program

**Section – D**

Legislation: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

**References:**

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection*. Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug Epidemic Among Indian Youth*, New Delhi: Mittal Pub.
5. Kessel, Neil and Henry Walton. 1982, *Alcoholism*. Harmond Worth: Penguin Books.
6. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
7. National Household Survey of Alcohol and Drug Abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
8. Ross Coomber and Others. 2013, *Key Concept in Drugs and Society*. New Delhi: Sage Publications.
9. Sain, Bhim 1991, *Drug Addiction Alcoholism, Smoking Obscenity*, New Delhi: Mittal Publications.
10. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab: A Sociological Study*. Amritsar: Guru Nanak Dev University.
11. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
12. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation*, Cambridge University Press.
13. Verma, P.S. 2017, “*Punjab’s Drug Problem: Contours and Characteristics*”, Economic and Political Weekly, Vol. LII, No. 3, P.P. 40-43.
14. World Drug Report 2016, United Nations office of Drug and Crime.
15. World Drug Report 2017, United Nations office of Drug and Crime.



**Paper – I: COMPUTER ARCHITECTURE****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

**Information Representation:** Register Transfer Language, Various Registers, Implementing Common Bus Using Multiplexers: Logical; Arithmetic & Shift Micro – operations.

**Basic Computer Design** Instruction Codes, Computer Instructions, Timing Signals, Instruction Cycle, Design of a Basic Computer.

**Section B**

**CPU Design** General Register Organization, Stack Organized CPU, Instruction Formats, Addressing Modes, Program Control, Hardwired & Microprogrammed (Wilhe's Design) Control Unit, RISC and CISC Characteristics.

**Section C**

**Memory Organization** Memory Hierarchy, Designs & Concepts of Main Memory, Auxiliary Memory, Associative Memory, Cache and Virtual Memory.

**Section D**

**I/O Organization** I/O Interface, Modes of Transfer, Program Interrupt, DMA & I/O Processor.

**Pipeline & Vector Processing** Introduction to Parallel Processing and Pipelining, SISD, SIMD & MISD, MIMD Machines.

**References:**

Computer System Architecture: M.M. Mano (PHI)

Computer Architecture: J.P. Hayes.

Computer Architecture: Patterson & Hemessy.

**Paper – II: DATABASE MANAGEMENT SYSTEM****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E–R diagram, different keys used in a relational system, SQL.

**Section B**

DBA, responsibilities of DBA, Relational form like 1NF, 2NF, 3NF, BCNF, 4<sup>th</sup> NF, 5<sup>th</sup> NF, DBTG, concurrency control and its management, protection, security, recovery of database.

**Section C**

SQL: Introduction to SQL–DDL, DML, DCL, Join methods & sub query, Union Intersection, Minus, Built in Functions, Views, Security amongst users, Sequences, Indexing Cursors–Implicit & Explicit, Functions & Packages Database Triggers.

**Section D**

Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL

**Books and References:**

1. Introduction to Database System by C.J. Date.
2. Database Management System by B.C. Desai.
3. Database Concept by Korth.
4. Simplified Approach to DBMS– Kalyani Publishers
5. Oracle – Developer – 2000 by Ivan Bayross.
6. Database System Concepts & Oracle (SQL/PLSQ) – AP Publishers.
7. <https://www.mongodb.com/nosql-explained>
8. Introduction to NoSQL (Ebook), NoSQL Seminar 2012 @ TUT, Arto Salminen

**Paper III: Introduction to PYTHON Programming****Time: 3 Hrs.****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

**Introduction to Python:** Python's Technical Strengths, Execution Model, Process of Computational Problem Solving, Different ways to run Python Programs.

**Data and Expressions:** Literals, Variables and Identifiers, Operators, Expressions, Strings, Statements and Data Types, Boolean Expressions (Conditions), Logical Operators, Selection Control, Nested conditions, Debugging

**Lists & Dictionaries:** List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python, Dictionaries and Files, Looping and dictionaries, Advanced text parsing

**Section B**

**Control Structures:** Conditional blocks using if, else and elif, While statement, Definite loops using For, Loop Patterns,

**Functions, Packages and Modules:** Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments, Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion, Understanding Packages, Modules, Top-Down Design, Python Modules Importing own module as well as external modules and packages.

**Section C**

**Files:** Opening Files, Using Text Files, Reading files, Writing files, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, String Processing, Exception Handling

**Objects and Their Use:** Introduction to Object Oriented Programming, Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using OOPS support

**Section D**

**Using Databases and SQL:** Database Concepts, SQL basic summary, SQL Database connection using python, creating and searching tables, Programming using database connections, Basic Data modelling, Programming with multiple tables

**Reference Books:**

1. Python for Informatics, Charles Severance, version 0.0.7
2. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach, Wiley Publications, 2012, ISBN : 978-0-470-91204-1
3. Introduction To Computation And Programming Using Python, GUTTAG JOHN V, PHI, 2014, ISBN-13: 978-8120348660
4. Introduction to Computing & Problem Solving Through Python, Jeeva Jose and Sojan P.Lal, Khanna Publishers, 2015, ISBN-13: 978-9382609810
5. Introduction to Computing and Programming in Python, Mark J. Guzdial, Pearson Education, 2015, ISBN-13: 978-9332556591
6. Fundamentals of Python by Kenneth Lambert, Course Technology, Cengage Learning, 2015
7. Learning Python by Mark Lutz, 5th Edition, O'Reilly Media, 2013

**Paper – IV  
(Programming Lab-I)**

**Lab – I:** Based on Python Programming Language : 50 Marks

**Paper – V  
(Programming Lab-II)**

**Lab – II:** Practical in Oracle : 25 Marks

**Paper – I: DATA STRUCTURES AND FILE PROCESSING****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

**Basic Data Structures:** Introduction to elementary Data Organization and operations, complexity of Algorithms and Time space trade off, Arrays, Stacks, Queues, Linked Lists.

**Section B**

Trees Binary Trees & Binary Search Trees. Graphs and Algorithms to manipulate them.

**Searching Techniques:** Linear and Binary Search.

**Section C**

**Sorting Techniques:** Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort.

**Section D**

**File Organization:** Concept of field, record, file, blocking and compaction.

**File Organization Techniques:** Sequential, indexed, indexed sequential, Direct, Hashing. Concept of master and transaction files.

**Text/References:**

1. Data Structure – Seymour Lipschutz, Schaum Outline Series.
2. File Structure & Data Structures by E. Loomis.
3. Data Structures by Trabley & Soreuson.

**Paper – II: INFORMATION SYSTEMS****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

Fundamental aspects of Information, Capturing of Information, Converting Information to Computer – readable form, source of Information, on–line Information access and capture.

**Section B**

What are systems? Information Systems? Categories of Information Systems, Development Life Cycle of Information system.

**Section C**

Various types of information systems: Transaction processing systems, office Automation systems, MIS and decision support system.

**Section D**

Case studies of the Information System: Accounting Information systems, Inventory control systems & Marketing systems.

**References:**

1. “Information Systems” by Mudride & Ross.
2. “Business Information Systems”, Muneesh Kumar.
3. “Information Systems for Managers”, Ashok Arora and A.K. Shaya Bhatia.

**Paper – III: INTERNET APPLICATIONS****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A**

**Introduction:** About internet and its working, business use of internet, services offered by internet, Evolution of internet, internet service provider (ISP), windows environment for dial up networking (connecting to internet), internet addressing (DNS) and IP addresses).

**E-Mail Basic Introduction;** Advantage and disadvantage, structure of an e-mail message, working of e-mail (sending and receiving messages), managing e-mail (creating new folder, deleting messages, forwarding messages, filtering messages).

**Section B**

Internet Protocol: Introduction, file transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCPIP.

**WWW:** Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark), web designing using HTML, DHTML with programming techniques.

**Section C**

**Search Engine:** About search engine, component of search engine, working of search engine, difference between search engine and web directory.

**Section D**

**Intranet and Extranet:** Introduction, application of intranet, business value of intranet, working of intranet, role of extranet, working of extranet, difference between intranet and extranet.

**References:**

1. “Understanding The Internet”, Kieth Sutherland, Butterworth-Heinemann; 1st Edition (October 31, 2000).
2. “Internet Technologies”, S. K. Bansal, APH Publishing Corporation (April 1, 2002).
3. “Data Communications and Networking”, Behrouz A. Forouzan, 3<sup>rd</sup> Edition.



**Paper – IV: SYSTEM SOFTWARE****Time: 3 Hours****M. Marks: 75****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section A****Introduction to System Software**

Introduction to System Software and its components  
Translators, loaders, interpreters, compiler, assemblers

**Section B****Assemblers:**

Overview of assembly process, design of one pass and two assemblers

**Macroprocessors:**

Macro definition and expansion, conditional macro expansion, Recursive macro expansion

**Section C****Compilers:**

Phases of Compilation Process, Lexical Analysis, Parsing, Storage Management Optimization  
Incremental Compilers, Cross Compilers.

**Section D****Loaders and Linkage Editors:**

Basic loader functions. Relocation, program linking, linkage, editors, dynamic linking, Bootstrap loaders

**References:**

1. Leland L. Beck: System Software, An Introduction to System Programming, Addison Wesley.
2. D.M. Dhamdhare: Introduction to System Software, Tata McGraw Hill.
3. D.M. Dhamdhare: System Software and Operating System, Tata McGraw Hill, 1992.
4. Madrich, Stuarde: Operating Systems, McGraw Hill, 1974.
5. Stern Nancy Assembler Language Programming for IBM and IBM Compatible Computers, John Wiley, 1991.

**Paper – V: LAB - I****Time: 3 Hours****M. Marks: 50**

Lab – Data Structure implementation using C++

**Paper – VI: LAB - II****Time: 3 Hours****M. Marks: 50**

Lab – Web Designing and use of Internet

**PAPER–VII (ESL-221): ENVIRONMENTAL STUDIES****Time: 3 Hrs.****Max. Marks: 100****Teaching Methodologies**

The Core Module Syllabus for Environmental Studies includes class room teaching and field work. The syllabus is divided into 8 Units [Unit-1 to Unit-VII] covering 45 lectures + 5 hours for field work [Unit-VIII]. The first 7 Units will cover 45 lectures which are class room based to enhance knowledge skills and attitude to environment. Unit-VIII comprises of 5 hours field work to be submitted by each candidate to the Teacher in-charge for evaluation latest by 15 December, 2019.

**Exam Pattern:**           **End Semester Examination- 75 marks**  
**Project Report/Field Study- 25 marks [based on submitted report]**  
**Total Marks- 100**

The structure of the question paper being:

**Part-A**, Short answer pattern with inbuilt choice       – **25 marks**

Attempt any five questions out of seven distributed equally from Unit-1 to Unit-VII. Each question carries 5 marks. Answer to each question should not exceed 2 pages.

**Part-B**, Essay type with inbuilt choice                       – **50 marks**

Attempt any five questions out of eight distributed equally from Unit-1 to Unit-VII. Each question carries 10 marks. Answer to each question should not exceed 5 pages.

**Project Report / Internal Assessment:**

**Part-C**, Field work – **25 marks [Field work equal to 5 lecture hours]**

The candidate will submit a hand written field work report showing photographs, sketches, observations, perspective of any topic related to Environment or Ecosystem. The exhaustive list for project report/area of study are given just for reference:

1. Visit to a local area to document environmental assets: River / Forest/ Grassland / Hill / Mountain / Water body / Pond / Lake / Solid Waste Disposal / Water Treatment Plant / Wastewater Treatment Facility etc.
2. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds
4. Study of tree in your areas with their botanical names and soil types
5. Study of birds and their nesting habits
6. Study of local pond in terms of wastewater inflow and water quality
7. Study of industrial units in your area. Name of industry, type of industry, Size (Large, Medium or small scale)
8. Study of common disease in the village and basic data from community health centre
9. Adopt any five young plants and photograph its growth
10. Analyze the Total dissolved solids of ground water samples in your area.
11. Study of Particulate Matter (PM<sub>2.5</sub> or PM<sub>10</sub>) data from Sameer website. Download from Play store.
12. Perspective on any field on Environmental Studies with secondary data taken from Central Pollution Control Board, State Pollution Control Board, State Science & Technology Council etc.

**Unit-I****The multidisciplinary nature of environmental studies**

Definition, scope and importance, Need for public awareness

**(2 lectures)****Unit-II****Natural Resources: Renewable and non-renewable resources:**

Natural resources and associated problems.

- (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
  - Role of an individual in conservation of natural resources.
  - Equitable use of resources for sustainable lifestyles.

**(8 Lectures)****Unit-III****Ecosystems**

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**(6 Lectures)****Unit-IV****Biodiversity and its conservation**

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

**(8 Lectures)**

**Unit-V****Environmental Pollution :****Definition :**

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

**(8 Lectures)****Unit-VI****Social Issues and the Environment**

- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Protection Act, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

**(7 Lectures)****Unit-VII****Human Population and the Environment**

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

**(6 Lectures)**

**Unit-VIII****Field Work**

- Visit to a local area to document environmental assets River / forest / grassland / hill / mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc

**(Field work equal to 5 lecture hours)**

**References:**

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. & Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
4. Joseph, K. & Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies, Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut.
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.



**Paper – I: COMPUTER NETWORKS****Time: 3 Hours****M. Marks: 75**

**Note 1: In theory eight questions are to be set in all. The candidates are required to attempt five of them. All questions are to be of equal marks.**

**2. The students can use only Non–Programmable & Non–Storage Type Calculators.**

**UNIT – I**

1. **Introduction:** Network Definition, Basic Components of a Network, Network types and topologies, Uses of Computer Networks, Network Architecture.  
Transmission Media: Coaxial cable, twisted pair cable, fibre optics & satellites. OSI reference model, TCP/IP reference model, comparison of OSI and TCP reference model.
2. **Introduction to Analog and Digital Transmission:** Telephone system, Modems, Types of modems, pulse code modulation.  
Transmission & Switching: Multiplexing, circuit switching, packet switching, hybrid switching, ISDN service transmission.

**UNIT – II**

3. **Local Area Network Protocols:** CSMA Protocols, BRAP, MLMA, IEEE standards 802, Token Bus, Token Ring, FDDI.
4. **Data Link Layer Design Issues:** Services provided to Network layer framing, error control, flow control, link management. Error detection & correction, Elementary Datalink Protocols.
5. **Design Issues of Network Layer:** Services provided to transport layer, routing, connection, internet & World Wide Web.

**UNIT – III**

6. **Network Security and Privacy:** Brief Introduction to Cryptography.
7. **Network Services:** File transfer, Access & Management, Electronic Mail, Remote login

**References:**

1. Tannanbum, A.S.: Computer Networks, Prentice Hall, 1992, 3<sup>rd</sup> Edition.
2. Stallings, William: Local Networks: An Introduction: Macmillan Publishing Co.
3. Stallings, William: Data Computer Communication, Macmillan Publishing Co.



**Paper II: WEB TECHNOLOGIES****Time: 3 Hrs.****M. Marks: 75****Note:**

- (i) **The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
- (ii) **The student can use only Non-programmable & Non-storage type calculator.**

**UNIT-I**

Web Essentials, Markup languages, CSS

Basics of Client side programming, Java script language, java script objects, host objects, Browsers and DOM

**UNIT-II**

Basics of Server side programming, Java servlets

ASP/JSP, Basics of ASP/JSP objects, simple ASP and JSP pages

Representing Web data, Data base connectivity, JDBC

**UNIT-III**

Introduction to PHP, basics, PHP File handling, file upload, cookies, error handling, PHP MySQL introduction

Middleware technologies, Ecommerce architecture and technologies, Ajax, Advanced web technologies and tools

**Case Studies:** PHP and MySQL case studies.

**References:**

1. Jeffery C Jackson, “Web Technology- A Computer Science Perspective”, Pearson Education, 2007.
2. Chris Bates, “Web Programming- Building Internet Applications”, Wiley India, 2006.
3. Achyut S Godbole and Atul Kahate, “Web Technologies”, Tata McGraw Hill.

**Paper – III: OPERATING SYSTEM****Time: 3 Hours****M. Marks: 75**

**Note 1: In theory eight questions are to be set in all. The candidates are required to attempt five of them. All questions are to be of equal marks.**

**2. The students can use only Non-Programmable & Non-Storage Type Calculators.**

**Unit – I**

1. **Introduction:** Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, Real-time Systems.
2. **Processes:** Process concepts, Process Scheduling, Threads.
3. **CPU-Scheduling:** Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.

**Unit – II**

4. **Process Synchronization:** Critical – section problem, semaphores, classical problem of synchronization.
5. **Memory Management:** Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation.
6. **Virtual Memory:** Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.

**Unit – III**

7. **Secondary Storage Structures:** Disk structures, Disk scheduling, Disk Reliability.
8. **Deadlocks:** System Model, Deadlock characterization, methods for handling deadlocks, Deadlocks Prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock handling.

**References:**

1. Operating System Concepts, Fourth Edition by Silberschatz Galvin Addison Wesley.
2. Operating Systems, A Design Oriented Approach” by Crowley, Published by Tata McGraw Hill.
3. Operating Systems, Second Edition by Dietel, Addison Wesley.

**Paper – IV: JAVA PROGRAMMING LANGUAGE****Time: 3 Hours****Max. Marks: 75**

- Note:**
- 1. In theory eight questions are to be set in all. The candidates are required to attempt five of them. All questions are to be of equal marks. The maximum marks of the paper is 75.**
  - 2. The student can use only Non-programmable & Non-storage type Calculator.**

**UNIT-I**

**Introduction to JAVA:** Object Orientation Concepts, Platform Independence & Cross Platform Computing, Control statements, Operators & Data types.

**UNIT-II**

Classes & Methods, constructors, Inheritance & Polymorphism. Packages & Interfaces, Multithreading in Java.

**UNIT-III**

Exception Handling, String handling in Java & Input/Output in Java.

**References:**

1. “Java–The Complete Reference”, Hurbert Schildt, Tata MacGraw Hill.
2. “Introduction to Java Programming”, Y. Daniel Mliang, Pearsons Publications.
3. “Beginning Web Programming with HTML, XHTML, and CSS”, Jon Duckett, John Wiley & Sons, 06 Aug. 2004.

**Paper–V**

**Time: 3 Hours**

**Marks: 50**

**Lab :**                   **Lab based on JAVA Programming Language**

**Paper–VI**

**Time: 3 Hours**

**Marks: 50**

**Lab :**                   **Lab based on ASP.NET**

**Paper – I: COMPUTER GRAPHICS****Time: 3 Hours****Total Marks: 75**

- Note 1. The paper setter is required to set eight questions in all and the candidates will be required to attempt any five. All questions carry equal marks.**
- 2. The students can use only Non-Programmable & Non-Storage Type Calculators.**

**UNIT – I**

- 1. Overview of Graphics system:** Computer Graphics and their applications.
- 2. Display Devices:** CRT Monitors (Random – Scan and Raster Scan, DVST, Plasma – Panel Display, LED and LCD Monitors.
- 3. Graphics Software.**

**UNIT – II**

- 4. Elementary Drawing:** Points and various line drawing Algorithms and their comparisons. Circle generating algorithms, Algorithms for ellipse, arc and spiral
- 5. Two Dimensional Transformations:** Basic Transformations, Scaling, Translation, Rotation, Reflection, Shear, Matrix representation of Basic transformations and homogenous coordinates.

**UNIT – III**

- 6. Composite Transformations:** Windowing and clipping. Windowing concepts, clipping and its algorithms. Window-to-view port transformations. Three Dimensional concepts. 3 D Coordinate Systems. 3 transformations. translation, scaling, rotation, projections, parallel projections. Perspective projection.
- 7. Implementation in C:** C programming for drawing 2 D objects – line rectangle, arc, circle and ellipse. C Programming for 2-D and 3-D transformations.

**References:**

1. Computer Graphics by Donal Hearn M. Pardive Baker (PHI) Easter Economy Edition.
2. Computer Graphics by Roy A. Plastock and Gordon Kalley – Schaum's Series.
3. Computer Graphics by Marc Berger.

**Paper – II: SOFTWARE ENGINEERING****Time: 3 Hours****M. Marks: 75**

**Note 1. In theory eight questions are to be set in all. The candidates are required to attempt five of them. All questions are to be of equal marks.**

**2. The students can use only Non–Programmable & Non–Storage Type Calculators.**

**UNIT – I**

1. **Introduction to Software:** Definition, Software characteristics, Software components, Software Applications.
2. **Introduction to Software Engineering:** Definition, Software Engineering Paradigms, waterfall method, prototyping, interactive Enhancement, The Spiral model, Fourth Generation Technique.
3. **Software Metrics:** Role of Metrics and measurement, Metrics for software productivity and quality, Measurement software, size–oriented metrics, function oriented metrics, Metrics for software quality.

**UNIT – II**

4. **Software Requirement Specification (SRS):** Problem analysis, structuring information, Data flow diagram and data dictionary, structured analysis, Characteristics and component of (SRS).
5. **Planning a Software Project:** Cost estimation, uncertainties in cost estimation, Single variable model, COCOMO model, On software size estimation, Project scheduling and milestones, Software & Personal Planning, Rayleigh curve, Personal Plan, Quality Assurance Plan, Verification & Validation (V & V), inspection & review.
6. **System Design:** Design Objectives, Design Principles, problem, Partitioning, Abstraction, Top Down and Bottom–up techniques, Structure Design, Structure Charts, Design Methodology, Design Review, Automated Cross Checking, Matrix, total number of modular, number of parameters.

**UNIT – III**

7. **Detailed Design:** Module specification, Specifying functional module, specifying data abstraction, PDL and Logic/Algorithm Design.
8. **Coding:** Coding by Top–down and Bottom–up, Structured Programming, Information Hiding, Programming style, Internal Documentation.
9. **Testing:** Level of testing, Test cases and test criteria, Functional Testing, Structural Testing.

**References:**

1. Software Engineering, Roger S. Pressman.
2. Integrated Approach to Software Engineering, Pankaj Jalote.

**Paper – III: Programming Laboratory**

**Time: 3 Hours**

**Lab: Implementation of Applications of Computer Graphics in C++/C Marks: 50**

**Paper – IV: PROJECT****Max. Marks: 200****General Instructions:**

1. A software module based on the work done in the entire course is to be developed.
2. The soft copy of the module shall be submitted to the College/Institute till April 30 of the respective semester.
3. The software module shall be developed in groups, consisting of at most two students in a group.
4. The respective college shall depute guide(s)/supervisor(s) under whose supervision the software module shall be developed. The guide/supervisor shall clarify that the work done is original & authenticated. The certificate found to be incorrect at any stage shall attract the proceedings against all the stakeholders, as per the University rules.
5. The evaluation of the module shall be done as per the common ordinance of UG/PG w.e.f. 2012–2013 under semester system.