

# **FACULTY OF ENGINEERING & TECHNOLOGY**

## **SYLLABUS**

### **FOR**

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

**Session: 2017-18**



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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	Communication Skills in English – I	50
Paper–V	Punjabi / ਮੁੱਢਲੀ ਪੰਜਾਬੀ (Compulsory)	50
Paper–VI	Practical–I (MS Office 2010 and Basic C Programming)	75
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	Communication Skills in English – II (Th.35+Pr.15)	50
Paper – V	Punjabi / ਮੁੱਢਲੀ ਪੰਜਾਬੀ (Compulsory)	50
Paper – VI	Practical – I (Advanced C++ Programming)	75
Paper – VII	* Drug Abuse: Problem, Management and Prevention (Compulsory Paper)	50

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

**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	Computational Problem Solving Using Python	75
Paper–IV	* Environmental Studies – I (Compulsory)	50
Paper–V	Programming Lab – Python	50
Paper–VI	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	* Environmental Studies – II (Compulsory)	50
Paper – VI	Lab – Data Structures Implementation using C++	50
Paper – VII	Lab – Web Designing and use of Internet	50

\* 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****Note:**

- 1. Eight questions are required to be set giving equal weightage to all the units. The candidates will have to attempt any five. All questions carry equal marks.**
- 2. The student can use only Non-programmable & Non-storage type Calculator.**

**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

**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.

**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

**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 ANSI C”.
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****Note:**

1. Eight questions are required to be set giving equal weightage to all the units. The candidates will have to attempt any five. All questions carry equal marks.
2. The student can use only Non-programmable & Non-storage type Calculator.

**UNIT-I****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.

**UNIT-II****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.

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

**UNIT-III**

**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

**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****Note:**

1. Eight questions are required to be set giving equal weightage to all the units. The candidates will have to attempt any five. All questions carry equal marks.
2. The student can use only Non-programmable & Non-storage type Calculator.

**UNIT-I**

**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

**UNIT-II**

**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.

**UNIT-III**

**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.

**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: COMMUNICATION SKILL IN ENGLISH – I****Time: 3 Hours****Max. Marks: 50****Course Contents:**

**1. Reading Skills:** Reading Tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings; Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

**Activities:**

- a) Active reading of passages on general topics
- b) Comprehension questions in multiple choice format
- c) Short comprehension questions based on content and development of ideas

**2. Writing Skills:** Guidelines for effective writing; writing styles for application, resume, personal letter, official/ business letter, memo, notices etc.; outline and revision.

**Activities:**

- a) Formatting personal and business letters.
- b) Organising the details in a sequential order
- c) Converting a biographical note into a sequenced resume or vice-versa
- d) Ordering and sub-dividing the contents while making notes.
- e) Writing notices for circulation/ boards

**Suggested Pattern of Question Paper:**

The question paper will consist of five skill-oriented questions from Reading and Writing Skills. Each question will carry 10 marks. The questions shall be phrased in a manner that students know clearly what is expected of them. There will be internal choice wherever possible.

**10x5=50 Marks**

- i) Multiple choice questions on the language and meanings of an unseen passage.
- ii) Comprehension questions with short answers on content, progression of ideas, purpose of writing etc. of an unseen passage.
- iii) Personal letter and Official/Business correspondence
- iv) Making point-wise notes on a given speech/ technical report OR  
Writing notices for public circulation on topics of professional interest
- v) Do as directed (10x1= 10 Marks) (change of voice, narration, combination of 2 simple sentences into one, subject-verb agreement, using appropriate tense, forms of verbs.

**Recommended Books:**

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



**Paper-V: ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)**

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ : 50

**ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ**

1. **ਗਿਆਨ ਮਾਲਾ** (ਵਿਗਿਆਨਕ ਤੇ ਸਮਾਜ-ਵਿਗਿਆਨਕ ਲੇਖਾਂ ਦਾ ਸੰਗ੍ਰਹਿ),  
(ਸੰਪਾ. ਡਾ. ਸਤਿੰਦਰ ਸਿੰਘ, ਪ੍ਰੋ. ਮਹਿੰਦਰ ਸਿੰਘ ਬਨਵੈਤ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।  
ਲੇਖ : ਪਹੀਆ ਪ੍ਰਦੂਸ਼ਣ, ਭਰੂਣ ਹੱਤਿਆ ਦੇ ਦੇਸ਼ ਵਿਚ, ਨਾਰੀ ਸ਼ਕਤੀ, ਵਾਤਾਵਰਣੀ ਪ੍ਰਦੂਸ਼ਣ ਅਤੇ ਮਨੁੱਖ, ਏਡਜ਼ : ਇਕ ਗੰਭੀਰ ਸੰਕਟ।
2. **ਆਤਮ ਅਨਾਤਮ** (ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)  
(ਪ੍ਰੋ. ਮੋਹਨ ਸਿੰਘ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ, ਸੁਰਜੀਤ ਪਾਤਰ, ਪਾਸ਼)  
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
3. **ਪੈਰਾ ਰਚਨਾ**
4. **ਪੈਰਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ।**
5. (ੳ) **ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ** : ਉਚਾਰਨ ਅੰਗ, ਉਚਾਰਨ ਸਥਾਨ ਤੇ ਵਿਧੀਆਂ, ਸਵਰ, ਵਿਅੰਜਨ, ਸੁਰ।  
(ਅ) **ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ** : ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪ-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ।
6. **ਮਾਤ ਭਾਸ਼ਾ ਦਾ ਅਧਿਆਪਨ**  
(ੳ) ਪਹਿਲੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ  
(ਅ) ਦੂਜੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ:**

- |   |            |
|---|------------|
| 1. ਕਿਸੇ ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) ।  | 10 ਅੰਕ     |
| 2. <b>ਆਤਮ ਅਨਾਤਮ</b> : ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ ।   | 10 ਅੰਕ     |
| 3. ਪੈਰਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉੱਤੇ ਪੈਰਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ ।   | 05 ਅੰਕ     |
| 4. ਪੈਰਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਪੰਜ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ।   | 05 ਅੰਕ     |
| 5. ਨੰਬਰ 5 ਉੱਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ 'ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ।  | 10 ਅੰਕ     |
| 6. ਨੰਬਰ 6 ਵਿਚ ਮਾਤ ਭਾਸ਼ਾ ਦੇ ਪਹਿਲੀ ਭਾਸ਼ਾ ਅਤੇ ਦੂਜੀ ਭਾਸ਼ਾ ਵਜੋਂ ਅਧਿਆਪਨ, ਮਹੱਤਵ ਅਤੇ ਸਮੱਸਿਆਵਾਂ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਦੋ ਦਾ ਉੱਤਰ ਦੇਣਾ ਹੋਵੇਗਾ। | 5×2=10 ਅੰਕ |

**PAPER – V: ਮੁੱਢਲੀ ਪੰਜਾਬੀ**

(In lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ: 50

**ਪਾਠ-ਕ੍ਰਮ**

1. ਪੈਂਤੀ ਅੱਖਰੀ; ਪੈਰ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ ਅਤੇ ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਲਗਾਂ ਮਾਤਰਾਂ
2. ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ)
3. (ੳ) ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹਾਂ ਦੀ ਵਰਤੋਂ,  
(ਅ) ਨਾਂਵ, ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸ਼ਣ, ਲਿੰਗ ਅਤੇ ਵਚਨ

**ਅੰਕ ਵੰਡ ਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਹਦਾਇਤਾਂ**

1. ਪੈਂਤੀ ਅੱਖਰੀ ਦੀ ਬਣਤਰ ਅਤੇ ਤਰਤੀਬ ਨਾਲ ਸੰਬੰਧਿਤ ਪ੍ਰਸ਼ਨ। 10 ਅੰਕ  
(ਦੋ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚੋਂ ਇੱਕ ਕਰਨਾ ਹੋਵੇਗਾ)  
ਕਵਰਗ, ਚਵਰਗ, ਤਵਰਗ, ਟਵਰਗ ਆਦਿ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ ਪੁੱਛਿਆ ਜਾ ਸਕਦਾ ਹੈ। ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ ਅਤੇ ਲਗਾਂ ਮਾਤਰਾਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਸੰਬੰਧਿਤ ਪ੍ਰਸ਼ਨ (ਦੋ ਵਿਚੋਂ ਇੱਕ ਕਰਨਾ ਹੋਵੇਗਾ) 10 ਅੰਕ
2. ਬਿੰਦੀ, ਟਿੱਪੀ ਅਤੇ ਅੱਧਕ ਦੀ ਵਰਤੋਂ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ 10 ਅੰਕ
3. (ੳ) ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹਾਂ ਦੀ ਵਰਤੋਂ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ 10 ਅੰਕ  
(ਅ) ਨਾਂਵ ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸ਼ਣ ਅਤੇ ਲਿੰਗ ਵਚਨ ਸੰਬੰਧੀ ਮੁੱਢਲੀ ਕਿਸਮ ਦੇ ਪ੍ਰਸ਼ਨ (ਦੋ ਵਿਚੋਂ ਇੱਕ ਕਰਨਾ ਹੋਵੇਗਾ) 10 ਅੰਕ

**Paper – VI: 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 – VII: DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION  
(COMPULSORY PAPER)**

**PROBLEM OF DRUG ABUSE**

**Time: 3 Hours**

**Max. Marks: 50**

**Instructions for the Paper Setters:**

**Section–A:** It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying five marks. Answer to any of the questions should not exceed two pages. **(15 Marks)**

**Section–B:** It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying ten marks. Answer to any of the questions should not exceed four pages. **(20 Marks)**

**Section–C:** It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages. **(15 Marks)**

**1) Meaning of Drug Abuse:** Concept and Overview, Historical Perspective of Drug Abuse, Drug Dependence, Drug Addiction, Physical and Psychological Dependence: Drug Tolerance and withdrawal symptoms.

**2) Types of Abused Drugs and their Effects:**

- 1) Stimulants: Amphetamines – Benzedrine, Dexedrine, Cocaine.
- 2) Depressants: Alcohol Barbiturates: Nembutal, Seconal, Phenobarbital and Rohypnol.
- 3) Narcotics: Heroin, Morphine, Oxycodone.
- 4) Hallucinogens: Cannabis, Marijuana, Hashish, Hash Oil, MDMA, LSD.
- 5) Steroids.

**3) Nature and Extent of the Problem:** Magnitude or prevalence of the menace of Drug Abuse in India and Punjab, Vulnerable groups by age, gender and economic status, Signs and Symptoms of Drug Abuse: Physical, Academic, Behavioural and Psychological Indicators.

**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. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention, Jaipur: Rawat Publication.
6. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
7. Sain, Bhim 1991, Drug Addiction Alcoholism, Smoking obscenity New Delhi: Mittal Publications.
8. Sandhu, Ranvinder Singh, 2009, Drug Addiction in Punjab: A Sociological Study. Amritsar: Guru Nanak Dev University.
9. Singh, Chandra Paul 2000. Alcohol and Dependence among Industrial Workers: Delhi: Shipra.
10. Sussman, S and Ames, S.L. (2008). Drug Abuse: Concepts, Prevention and Cessation, Cambridge University Press.
11. World Drug Report 2010, United Nations office of Drug and Crime.
12. World Drug Report 2011, United Nations office of Drug and Crime.

**Paper–I: INTRODUCTION TO PROGRAMMING - C++****Time: 3 Hours****M. Marks: 75****Note:**

- 1. Eight questions are required to be set giving equal weightage to all the units. The candidates will have to attempt any five. All questions carry equal marks.**
- 2. The student can use only Non-programmable & Non-storage type Calculator.**

**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.

**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.

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

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

**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****Note:**

- 1. Eight questions are required to be set giving equal weightage to all the units. The candidates will have to attempt any five. All questions carry equal marks.**
- 2. The student can use only Non–programmable & Non–storage type Calculator.**

**UNIT-I**

**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

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

**UNIT-II**

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

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

**UNIT-III**

**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****Note:**

1. Eight questions are required to be set giving equal weightage to all the units. The candidates will have to attempt any five. All questions carry equal marks.
2. The student can use only Non-programmable & Non-storage type Calculator.

**Note for Paper Setter:**

- 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.

**UNIT-I****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.

**UNIT-II**

4. Numerical Integration and different Trapezoidal Rule, Simpson's 3/8 Rule.
5. Interpolation and Curve Fitting, Lagrangian Polynomials, Newton's Methods: Forward Difference Method, Backward Difference Method Divided Difference Method.
6. Least square fit linear trend, Non-linear trend.  
 $Y = ax^b$   
 $Y = ab^x$   
 $Y = ae^x$   
 Polynomial fit:  $Y = a+bx+cn^2$

**UNIT-III****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.

**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: COMMUNICATION SKILLS IN ENGLISH – II****Time: 3 Hours****Max. Marks: 50****Theory Marks: 35****Practical Marks: 15****Course Contents:**

1. **Listening Skills:** Barriers to listening; effective listening skills; feedback skills. Attending telephone calls; note taking.

**Activities:**

- a) Listening exercises – Listening to conversation, News and TV reports
- b) Taking notes on a speech/lecture

2. **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.  
The study of sounds of English, stress  
Situation based Conversation in English  
Essentials of Spoken English

**Activities:**

- a) Making conversation and taking turns
- b) Oral description or explanation of a common object, situation or concept
- c) Giving interviews

**Suggested Pattern of Question Paper:**

The question paper will consist of seven questions related to speaking and listening Skills. Each question will carry 5 marks. The nature of the questions will be as given below:-

**Two** questions requiring students to give descriptive answers.

**Three** questions in the form of practical exercises requiring students to give an appropriate response to a question, a proposal, a proposition, an invitation etc. For example, the paper setter may give a proposition and ask the students to agree or disagree with it or introduce a character giving invitations and ask the students to accept or refuse it etc.

**Two** questions requiring students to transcribe simple words in IPA symbols, marking stress.

**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 of 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-V: ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)**

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ : 50

**ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ**

1. **ਗਿਆਨ ਮਾਲਾ** (ਵਿਗਿਆਨਕ ਤੇ ਸਮਾਜ-ਵਿਗਿਆਨਕ ਲੇਖਾਂ ਦਾ ਸੰਗ੍ਰਹਿ)  
(ਸੰਪ. ਡਾ. ਸਤਿੰਦਰ ਸਿੰਘ, ਪ੍ਰੋ. ਮਹਿੰਦਰ ਸਿੰਘ ਬਨਵੈਤ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ, 2007  
ਲੇਖ : ਸਾਹਿਤ ਤੇ ਲੋਕ ਸਾਹਿਤ, ਔਖਾਂ, ਅਚੇਤਨ ਦਾ ਗੁਣ ਤੇ ਸੁਭਾਅ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ, ਮਨੁੱਖੀ ਅਧਿਕਾਰ।
2. **ਆਤਮ ਅਨਾਤਮ** (ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ) (ਕਹਾਣੀਆਂ)  
**ਪਠਾਣ ਦੀ ਧੀ** (ਸੁਜਾਨ ਸਿੰਘ), **ਸਾਂਝੀ ਕੰਧ** (ਸੰਤੋਖ ਸਿੰਘ ਧੀਰ), **ਉਜਾੜ** (ਕੁਲਵੰਤ ਸਿੰਘ ਵਿਰਕ), **ਘੋਟਣਾ** (ਮੋਹਨ ਭੰਡਾਰੀ), **ਦਲਦਲ** (ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)  
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
3. **ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ** : ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ
4. **ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ**
5. **ਪੈਰ੍ਹਾ ਰਚਨਾ**
6. **ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ**
7. **ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ**

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ:**

- |      |  |        |
|------|--|--------|
| 1.   | ਕਿਸੇ ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) ।  | 10 ਅੰਕ |
| 2.   | <b>ਆਤਮ ਅਨਾਤਮ</b> : ਸਾਰ, ਵਿਸ਼ਾ ਵਸਤੂ, ਪਾਤਰ ਚਿਤਰਣ ।   | 10 ਅੰਕ |
| 3-4. | 3-4 ਨੰਬਰ ਉੱਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ।   | 10 ਅੰਕ |
| 5.   | ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉੱਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ ।   | 05 ਅੰਕ |
| 6.   | ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਪੰਜ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ  | 05 ਅੰਕ |
| 7.   | ਨੰਬਰ 7 ਵਿਚ ਅੱਠ ਅਖਾਣ ਅਤੇ ਅੱਠ ਮੁਹਾਵਰੇ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਪੰਜ-ਪੰਜ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤ ਕੇ ਅਰਥ ਸਪੱਸ਼ਟ ਕਰਨੇ ਹੋਣਗੇ। |        |

5+ 5=10 ਅੰਕ

**PAPER – V: ਮੁੱਢਲੀ ਪੰਜਾਬੀ**

(In lieu of Compulsory Punjabi)

ਸਮਾਂ: 3 ਘੰਟੇ

ਕੁਲ ਅੰਕ: 50

ਪਾਠ – ਕ੍ਰਮ

- |    |  |        |
|----|--|--------|
| 1. | ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ<br>ਸੰਯੁਕਤ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ<br>ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ  | 20 ਅੰਕ |
| 2. | ਭਾਸ਼ਾ ਅਤੇ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ<br>ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ   | 15 ਅੰਕ |
| 3. | ਪੰਜਾਬੀ ਵਾਕ ਬਣਤਰ<br>ਸਾਧਾਰਨ ਵਾਕ: ਕਿਸਮਾਂ<br>ਸੰਯੁਕਤ ਵਾਕ: ਕਿਸਮਾਂ<br>ਮਿਸ਼ਰਤ ਵਾਕ: ਕਿਸਮਾਂ<br>ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਰਤੋਂ ਦੇ ਵਿਭਿੰਨ ਸਮਾਜਿਕ ਪ੍ਰਸੰਗ | 15 ਅੰਕ |

**ਯੂਨਿਟ ਅਤੇ ਥੀਮ**

1. **ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ:** ਸੰਯੁਕਤ ਸ਼ਬਦ; ਸਮਾਸੀ ਸ਼ਬਦ (ਜਿਵੇਂ ਲੋਕ ਸਭਾ); ਦੋਹਰੇ ਸ਼ਬਦ / ਦੁਹਰਰੁਕਤੀ (ਜਿਵੇਂ ਧੂੜ ਧਾੜ / ਭਰ ਭਰ), ਮਿਸ਼ਰਤ ਸ਼ਬਦਾਂ ਦੀ ਬਣਤਰ/ਸਿਰਜਨਾ; ਅਗੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਉਪ ਭਾਸ਼ਾ), ਪਿਛੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਰੰਗਲਾ), ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ: ਪੜਨਾਵੀਂ ਰੂਪ, ਕਿਰਿਆ/ਸਹਾਇਕ ਕਿਰਿਆ ਦੇ ਰੂਪ; ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ: ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਮੌਸਮਾਂ, ਗਿਣਤੀ ਨਾਲ ਸੰਬੰਧਿਤ ।
2.
  - I. ਭਾਸ਼ਾ ਅਤੇ ਮਾਤ ਭਾਸ਼ਾ ਦੇ ਮਹੱਤਵ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ
  - II. ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ
3. **ਪੰਜਾਬੀ ਵਾਕ ਬਣਤਰ:** ਕਰਤਾ ਕਰਮ ਕਿਰਿਆ; ਸਾਧਾਰਨ ਵਾਕ, ਬਿਆਨੀਆ, ਪ੍ਰਸ਼ਨਵਾਚਕ, ਆਗਿਆਵਾਚਕ, ਸੰਯੁਕਤ ਅਤੇ ਮਿਸ਼ਰਤ ਵਾਕਾਂ ਦੀਆਂ ਕਿਸਮਾਂ; ਸੁਤੰਤਰ ਅਤੇ ਅਧੀਨ ਉਪਵਾਕ; ਸਮਾਨ (ਤੇ/ਅਤੇ) ਅਤੇ ਅਧੀਨ (ਜੋ/ਕਿ) ਯੋਜਕਾਂ ਦੀ ਵਰਤੋਂ; ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਰਤੋਂ: ਵਿਭਿੰਨ ਸਮਾਜਿਕ/ਸਭਿਆਚਾਰਕ ਪ੍ਰਸੰਗ; ਘਰ ਵਿਚ, ਬਾਜ਼ਾਰ ਵਿਚ, ਮੇਲੇ ਵਿਚ, ਸ਼ੋਪਿੰਗ ਮਾਲ/ਸਿਨੇਮੇ ਵਿਚ, ਵਿਆਹ ਵਿਚ, ਧਾਰਮਿਕ ਸਥਾਨਾਂ ਵਿਚ, ਦੋਸਤਾਂ ਨਾਲ ਆਦਿ।

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ**

1. ਪਹਿਲੇ ਯੂਨਿਟ ਵਿੱਚੋਂ ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ ਨਾਲ ਸਬੰਧਿਤ 5-5 ਅੰਕਾਂ ਦੇ ਤਿੰਨ ਵਿਹਾਰਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।  
ਅੰਕਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਇਕ-ਇਕ ਜਾਂ ਦੋ-ਦੋ ਅੰਕਾਂ ਦੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕੀਤੀ ਜਾ ਸਕਦੀ ਹੈ।  
ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਸ਼ਬਦਾਵਲੀ ਨਾਲ ਸਬੰਧਿਤ ਇਕ-ਇਕ ਅੰਕ ਦੇ ਪੰਜ (ਆਬਜੈਕਟਿਵ) ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

**20 ਅੰਕ**

2. ਦੂਸਰੇ ਯੂਨਿਟ ਵਿੱਚ ਭਾਸ਼ਾ ਅਤੇ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ ਨਾਲ ਸਬੰਧਿਤ 5-5 ਅੰਕਾਂ ਦੇ ਤਿੰਨ ਵਿਹਾਰਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।  
ਅੰਕਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਇੱਕ-ਇੱਕ ਜਾਂ ਦੋ-ਦੋ ਅੰਕਾਂ ਦੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨਾਂ ਵਿੱਚ ਕੀਤੀ ਜਾ ਸਕਦੀ ਹੈ।

**15 ਅੰਕ**

3. ਤੀਜੇ ਯੂਨਿਟ ਵਿੱਚ ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ ਨਾਲ ਸਬੰਧਿਤ 5-5 ਅੰਕਾਂ ਦੇ ਦੋ ਵਿਹਾਰਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਅੰਕਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਇਕ-ਇਕ ਜਾਂ ਦੋ-ਦੋ ਅੰਕਾਂ ਦੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕੀਤੀ ਜਾ ਸਕਦੀ ਹੈ।  
ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਿਹਾਰਕ ਵਰਤੋਂ ਨਾਲ ਸਬੰਧਿਤ 5 ਅੰਕਾਂ ਦਾ ਇਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛਿਆ ਜਾਵੇਗਾ, ਜਿਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਕਿਸੇ ਸਮਾਜਿਕ/ਸਭਿਆਚਾਰਕ ਪ੍ਰਸੰਗ ਵਿਚ ਵਰਤੇ ਜਾਂਦੇ ਪੰਜ ਵਾਕ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ।  
ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਭਾਸ਼ਾ ਸਰਲ ਅਤੇ ਸਪਸ਼ਟ ਰੱਖੀ ਜਾਵੇ।

**15 ਅੰਕ**

**Paper – VI: Practical–I****(Advanced C++ Programming)****M. Marks: 75**

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

**PAPER – VIII: DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION  
(COMPULSORY PAPER)**

**DRUG ABUSE: MANAGEMENT AND PREVENTION**

**Time: 3 Hours**

**Max. Marks: 50**

**Instructions for the Paper Setters:**

**Section–A:** It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying five marks. Answer to any of the questions should not exceed two pages. **(15 Marks)**

**Section–B:** It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying ten marks. Answer to any of the questions should not exceed four pages. **(20 Marks)**

**Section–C:** It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages. **(15 Marks)**

**1) Consequences of Drug Abuse for:**

- 1) Individual – Education, employment and income issues.
- 2) Family – Violence
- 3) Society – Crime.
- 4) Nation – Law and order problem.

**2) Management of Drug abuse:**

- 1) Medical Management: Medication for treatment and to reduce withdrawal effects, Drug De-addiction clinics, Relapse management.
- 2) Psycho-Social Management: Counselling, family and group therapy, behavioural and cognitive therapy, Environmental Intervention.

**3) Prevention of Drug Abuse:**

- 1) Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.
- 2) School  
Counselling, Teacher as role-model. Parent-Teacher-Health Professional Coordination, Random testing on students.
- 3) Media:  
Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program
- 4) Legislaion: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

**References:**

1. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
2. Inciardi, J.A. 1981. *The Drug Crime Connection*. Beverly Hills: Sage Publications.
3. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
4. Sain, Bhim 1991, *Drug Addiction Alcoholism, Smoking obscenity* New Delhi: Mittal Publications.
5. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab: A Sociological Study*. Amritsar: Guru Nanak Dev University.
6. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
7. World Drug Report 2011, United Nations office of Drug and Crime.
8. World Drug Report 2010, United Nations office of Drug and Crime.



**Paper – I: COMPUTER ARCHITECTURE****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. The maximum marks of the paper is 75.
2. The student can use only Non-programmable & Non-storage type Calculator.

**UNIT-I**

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

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

**UNIT-II**

**CPU Design** Stack Organized CPU, Instruction Formats, Addressing Modes, Program Control, Hardwired & Microprogrammed (Wilhe's Design) Control Unit.

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

**UNIT-III**

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

**Pipeline & Vector Processing** Parallel Processing Pipelining, Parallel & Distributed Computers, SISD, SIMD & MISD, MIMD Machines, Vector Processing.

**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**

**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**

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.

**UNIT-II**

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.

**UNIT-III**

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

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: COMPUTATIONAL PROBLEM SOLVING USING PYTHON****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.

**Introduction to Python:** Process of Computational Problem Solving, Python Programming Language

**Data and Expressions:** Literals, Variables and Identifiers, Operators, Expressions, Statements and Data Types

**Control Structures:** Boolean Expressions (Conditions), Logical Operators, Selection Control, Nested conditions, Debugging

**Lists:** List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python

**Functions:** Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments

**Iteration:** While statement, Definite loops using For, Loop Patterns, Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion

**Dictionaries:** Dictionaries and Files, Looping and dictionaries, Advanced text parsing

**Files:** Opening Files, Using Text Files, String Processing, Exception Handling

**Objects and Their Use:** Introduction to Object Oriented Programming

**Modular Design:** Modules, Top-Down Design, Python Modules

**Using Databases and SQL:** Database Concepts, SQLite Manager Firefox Add-on, SQL basic summary, Basic Data modeling, 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: ENVIRONMENTAL STUDIES-I****Time: 3 Hrs.****Max. Marks: 50****Theory Lectures: 1½ Hours/ Week**

**Section–A: (15 Marks):** It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying five marks. Answer to any of the questions should not exceed two pages.

**Section–B: (20 Marks):** It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying ten marks. Answer to any of the questions should not exceed four pages.

**Section–C: (15 Marks):** It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

**1. The Multidisciplinary Nature of Environmental Studies:**

- Definition, scope & its importance.
- Need for public awareness.

**2. Natural Resources:**

- Natural resources and associated problems:
  - a) **Forest Resources:** Use of 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, change caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problem, salinity, case studies.
  - e) **Energy Resources:** Growing of energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.
  - f) **Land Resources:** Land as a resource, land degradation, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**3. Ecosystem:**

- 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 ecosystems:
  - a. Forest ecosystem
  - b. Grassland ecosystem

- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### 4. Social Issues and Environment:

- From unsustainable to sustainable development.
- Urban problems 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:
  - Air (prevention and Control of Pollution) Act.
  - Water (prevention and Control of Pollution) Act.
  - Wildlife Protection Act.
  - Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

#### 5. National Service Scheme

- **Introduction and Basic Concepts of NSS:** History, philosophy, aims & objectives of NSS; Emblem, flag, motto, song, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries.
- **Health, Hygiene & Sanitation:** Definition, needs and scope of health education; Food and Nutrition; Safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan); National Health Programme; Reproductive health.

#### References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Down to Earth, Centre for Science and Environment, New Delhi.
4. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
6. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar
10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.

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

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

**Paper – I: DATA STRUCTURES AND FILE PROCESSING****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**

**Basic Data Structures:** Introduction to elementary Data Organization and operations, complexity of Algorithms and Time space trade off, string processing. Arrays, Stacks, Queues, Linked Lists, Trees Binary Trees & Binary Search Trees. Graphs and Algorithms to manipulate them.

**UNIT-II**

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

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

**UNIT-III**

**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**

**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**

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

**UNIT-II**

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

Technologies for Information System: Latest trends in Hardware and Software.

**UNIT-III**

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

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**

**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**

**Introduction:** About internet and its working, business use of internet, services offered by internet, evaluation of internet, internet service provider (ISP), windows environment for dial up networking (connecting to internet), audio on 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) Implementation of outlook express.

**UNIT-II**

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

**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.

**UNIT-III**

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

**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**

**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.**

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

**UNIT-I****Introduction to System Software**

Introduction to System Software and its components

Translators, loaders, interpreters, compiler, assemblers

**UNIT-II****Assemblers**

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

**Macroprocessors**

Macro definition and expansion, concatenation of macro parameters, generations of unique labels, conditional macro expansion, Recursive macro expansion

**UNIT-III****Compilers**

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

**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: ENVIRONMENTAL STUDIES-II****Time: 3 Hrs.****Max. Marks: 50****Theory Lectures: 1½ Hours/ Week**

**Section–A: (15 Marks):** It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying five marks. Answer to any of the questions should not exceed two pages.

**Section–B: (20 Marks):** It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying ten marks. Answer to any of the questions should not exceed four pages.

**Section–C: (15 Marks):** It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

**1. Biodiversity and its Conservation:**

- Definition: Genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of Biodiversity: Consumptive use; productive use, social, ethical, aesthetic and option values.
- Biodiversity of global, National and local levels.
- India as mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to Biodiversity: Habitat loss, poaching of wild life, man wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of Biodiversity: In situ and Ex-situ conservation of biodiversity.

**2. Environmental Pollution:**

- Definition, causes, effects and control measures of:
  - a) Air Pollution
  - b) Water Pollution
  - c) Soil Pollution
  - d) Marine Pollution
  - e) Noise Pollution
  - f) Thermal Pollution
  - g) Nuclear Hazards
  - h) Electronic Waste
- 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.

**3. Human Population and the Environment**

- Population growth, variation among nations.
- Population explosion-Family welfare programme.

- 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.
- Road Safety Rules & Regulations: Use of Safety Devices while Driving, Do's and Don'ts while Driving, Role of Citizens or Public Participation, Responsibilities of Public under Motor Vehicle Act, 1988, General Traffic Signs.
- Accident & First Aid: First Aid to Road Accident Victims, Calling Patrolling Police & Ambulance.

#### 4. National Service Scheme

- **Entrepreneurship Development:** Definition & Meaning; Qualities of good entrepreneur; Steps/ ways in opening an enterprise; Role of financial and support service Institutions.
- **Civil/Self Defense:** Civil defense services, aims and objectives of civil defense; Needs for self defense training.

#### 5. Field Visits:

- 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.
- Contribution of the student to NSS/any other social cause for service of society.

**Note:** In this section the students will be required to visit and write on the environment of an area/ ecosystem/village industry/disaster/mine/dam/agriculture field/waste management/hospital etc. with its salient features, limitations, their implications and suggestion for improvement.

#### References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Down to Earth, Centre for Science and Environment, New Delhi.
4. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
6. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar
10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.

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

Lab – Data Structure implementation using C++

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

Lab – Web Designing and use of Internet

**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.