Syllabus for

Bachelor of Computer

Applications (BCA)

Semester: I - VI

Examination 2026-

Syllabus for Batch



Directorate of Online Studies

Guru Nanak Dev University

(ESTABLISHED UNDER STATE LEGISLATURE ACT NO. 21 OF 1969)
Accredited by National Assessment and Accreditation Council (NAAC) At 'A++' Grade (Highest Level) As Per Modified Criteria Notified On 27/07/2017 And Conferred 'University with Potential for Excellence' Status and 'Category-I University' As Per University Grants Commission (F. No. 1-8-2017/(CPP-II) Dated 12/02/2018)



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Note:

(i) Copy rights are reserved. Nobody is allowed to print it in any form.Defaulters will be prosecuted.

(ii) The syllabi are subject to change therefore, visit the website from time to time to keep yourself updated.

BACHELOR OF COMPUTER APPLICATIONS (SEMESTER SYSTEM) under Directorate of Online Studies, Guru Nanak Dev University, Amritsar

Eligibility:

+2 with at least 40% marks in aggregate or equivalent examination.

SEMESTER-I

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLBCA - 111T	Introduction to Programming in C	30	70	100	4
OLBCA - 112T	Introduction to Computers and Information Technology	30	70	100	4
OLBCA - 113T	Communication Skills in English-I	30	70	100	4
OLBCA - 114T	Punjabi (Compulsory) – I	30	70	100	4
OLBCA - 115P	Programming Laboratory - I	30	70	100	4
OLSOA – 116T	Drug Abuse: Problem, Management and Prevention (Compulsory Paper)	30	70	100	4
OLBCA – 117T#	Punjab History Culture – I	30#	70#	100#	4#
	Total Marks & Credits	**180**	**420**	**600**	**24**

Note: # In lieu of Punjabi (Compulsory) – I (for those students, who are not domicile of Punjab)

SEMESTER-II

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLBCA - 211T	Introduction to Programming in C++	30	70	100	4
OLBCA - 212T	Principles of Digital Electronics	30	70	100	4
OLBCA - 213T	Numerical Methods and Statistical Techniques	30	70	100	4
OLBCA - 214T	Communication Skills in English – II	30	70	100	4
OLBCA - 215T	Punjabi (Compulsory) – II	30	70	100	4
OLBCA - 216P	Programming Laboratory - II	30	70	100	4
OLBCA – 217T#	Punjab History Culture – II	30#	70#	100#	4#
	Total Marks & Credits	**180**	**420**	**600**	**24**

Note: # In lieu of Punjabi (Compulsory) – II (for those students, who are not domicile of Punjab)

SEMESTER - III

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLBCA - 311T	Computer Architecture	30	70	100	4
OLBCA - 312T	Database Management System	30	70	100	4
OLBCA - 313T	Computational Problem Solving using Python	30	70	100	4
OLBCA - 314P	Programming Laboratory - III	30	70	100	4
OLESL – 315T	Environmental Studies (Compulsory)	30	70	100	4
	Total Marks & Credits	**150**	**350**	**500**	**20**

SEMESTER - IV

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLBCA - 411T	Data Structure & File Processing	30	70	100	4
OLBCA - 412T	Information Systems	30	70	100	4
OLBCA - 413T	Internet Applications	30	70	100	4
OLBCA - 414T	System Software	30	70	100	4
OLBCA - 415P	Programming Laboratory – IV	30	70	100	4
	Total Marks & Credits	**150**	**350**	**500**	**20**

SEMESTER - V

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLBCA - 511T	Computer Networks	30	70	100	4
OLBCA - 512T	Web Technologies	30	70	100	4
OLBCA - 513T	Operating System	30	70	100	4
OLBCA – 514P	Programming Laboratory – V	30	70	**100**	**4**
OLBCA – 515T	**Applied & Discrete Mathematics**	30	70	100	4
	Total Marks & Credits	**150**	**350**	**500**	**20**

SEMESTER - VI

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
OLBCA - 611T	Computer Graphics	30	70	100	4
OLBCA - 612T	Software Engineering	30	70	100	4
OLBCA – 613P	Project	90	210	300	12
OLBCA – 614P	Programming Laboratory – VI	30	70	100	4
	Total Marks & Credits	**100**	**420**	**600**	**24**

OLBCA-111T: Introduction to Programming in C

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

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. Bala guru swamy: "Programming in ANSI C".
2. Scaum Outline Series: "Programming in C".
3. Dennis & Ritchie: "Programming in C".
4. Stephen G. Kochar: "C Programming".
5. http://www.swayam.gov.in
6. http://edx.org (formerly http://mooc.org)

OLBCA-112T: Introduction to Computers and Information Technology

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

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2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
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4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

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.

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

Section-C

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. e-Books at OpenOffice.org
7. A Conceptual Guide to OpenOffice.org3, 2nd Edition, — R.Gabriel Gurley
8. http://www.swayam.gov.in
9. http://edx.org (formerly http://mooc.org)

OLBCA-113T: Communication Skills in English – I

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

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2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

(Reading Skills and Sentence Structure)

Reading for direct meanings; Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions, Structure of a sentence, Voice, narration, combination of two simple sentence etc.

Activities:

a. Active reading of passages on general topics

b. subject-verb agreement

c. using appropriate tenses/ verb etc.

Section-B

(Reading Skills)

Reading Tactics and strategies; Improving reading Skills, Reading purposes–kinds of purposes and associated comprehension

Activities:

a. Comprehension questions in multiple choice format

b. Short comprehension questions based on content and development of ideas

Section-C

(Writing Skills)

Guidelines for effective writing, writing styles for application, resume, notes making, report writing

Activities:

a. Organizing the details in a sequential order.

b. Converting a biographical note into a sequenced resume or vice-versa

c. Ordering and sub-dividing the contents while making notes.

d. Resume and Report Writing

Section-D

(Writing Skills)

Personal letter, official/ business letter, memo, notices etc.; outline and revision and Tender etc.

Activities:

a. Formatting personal and business letters

b. Writing notices for circulation/ boards

c. Tender Writing

d. Memorandum

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *English Grammar in Use* (Fourth Edition) by Raymond Murphy, CUP
3. http://swayam.gov.in
4. http://edx.org (formerly http://mooc.org)

OLBCA-114T - Punjabi (Compulsory) -I

ਸਮਾਂ: 3 ਘੰਟੇ ਕੁਲ ਅੰਕ: 70+30=100

Section - A

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, ਏਡਜ: ਇਕ ਗੰਭੀਰ ਸੰਕਟ |

Section - B

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 ।

Section - C

ਪੈਰ੍ਹਾ ਰਚਨਾ

ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ ।

Section - D

(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।
ਮਾਤ ਭਾਸ਼ਾ ਦਾ ਅਧਿਆਪਨ
(ੳ) ਪਹਿਲੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ
(ਅ) ਦੂਜੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ

Suggested Readings:

- ਗਿਆਨ ਮਾਲਾ
- ਆਤਮ ਅਨਾਤਮ
- http://swayam.gov.in/
- http://edx.org formerly http://mooc.org/

OLBCA-117T : Punjab History Culture -I

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

1. Land and the People.
2. Bhakti Movement

Section-B

3. Life and Teaching of Guru Nanak Dev.
4. Contribution of Guru Angad Dev, Guru Arjun Dev ,Guru Amar Das and Guru Ram Das.

Section-C

5. Guru Hargobind.
6. Martyrdom of Guru Teg Bahadur

Section-D

7. Guru Gobind Singh and the Khalsa.
8. Banda Singh Bahadur: Conquests and Execution.

Suggested Reading

Kirpal Singh(ed.), *History and Culture of the Punjab, Part-ii, Punjabi University*, Patiala. 1990.
Fauja Singh (ed.), *History of Punjab, Vol, III Punjabi University, Patiala, 1987.*
J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*
Khushwant Singh, *A History of the Sikhs*, Vol. I, OUP, New Delhi, 1990
http://swayam.gov.in/
http://edx.org formerly http://mooc.org/

OLBCA-115P : Programming Laboratory – I

(MS Office 2010 & Basic C Programming)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Operational Knowledge of:

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

OLSOA 116T: Drug Abuse: Problem, Management And Prevention (Compulsory Paper)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Meaning of Drug Abuse:

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

2) Consequences of Drug Abuse for:

Individual

:

Education, Employment, Income.

Family

:

Violence.

Society

:

Crime.

Nation

:

Law and Order problem.

Section – B

Management of Drug Abuse:

(i)

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

(ii)

Psychiatric Management: Counselling, Behavioural and Cognitive therapy.

(iii)

Social Management: Family, Group therapy and Environmental Intervention, Rehabilitation.

Section – C

Prevention of Drug abuse:

(i)

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

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

Section – D

Controlling Drug Abuse:

(i)
Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program
(ii)
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, *Alcohalism. 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 Characterstics",* 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.

OLBCA-211T - Introduction to Programming in C++

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
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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

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

Section-D

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 Schildth, Tata McGraw Hill.
2. Designing Object Oriented Software Rebacca 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.
5. http://swayam.gov.in
6. http://edx.org (formerly http://mooc.org)

OLBCA-212T : Principles of Digital Electronics

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
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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, Subtracter, Multiplexer, Demultiplexer, Decoeer, 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.
7. http://swayam.gov.in
8. http://edx.org (formerly http://mooc.org)

OLBCA-213T : Numerical Methods & Statistical Techniques

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
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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.

Section-B

3. Simultaneous Solution of Equations, Gauss Elimination Method Gauss Jordan Method.
4. Numerical Integration and different Trapezoidal Rule, Simpson's 3/8 Rule.

Section-C

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: $Y = a+bx+cn^2$

Section-D

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
3. http://swayam.gov.in
4. http://edx.org (formerly http://mooc.org)

OLBCA-214T : Communication Skills in English – II

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above.In no case a question should be asked outside the syllabus.

Section-A

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

Section B

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:

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

Section C

Speaking Skills: The study of sounds of English, stress Situation based Conversation in English, Essentials of Spoken English

Activities:

a. Presentation on a given topic
b. Extempore

Section D

Oral Testing: Meaning of Interviews, Types of Interviews, Planning and conducting Interviews, Meaning and Importance of Group Discussion

Activities:

a. Giving Interviews
b. Group Discussion 21

Practical / Oral Testing (Internal)

Marks: 10

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.

OLBCA-215T : Punjabi (Compulsory) -II

ਸਮਾਂ : 3 ਘੰਟੇ **ਕੁਲ ਅੰਕ : 70+30=100**

Section - A

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, ਅੱਖਾਂ, ਅਚੇਤਨ ਦਾ ਗੁਣ ਤੇ ਸੁਭਾਅ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ, ਮਨੁੱਖੀ ਅਧਿਕਾਰ।

Section - B

2। **ਆਤਮ ਅਨਾਤਮ** (ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ) (ਕਹਾਣੀਆਂ)

ਪਠਾਣ ਦੀ ਧੀ (ਸੁਜਾਨ ਸਿੰਘ), **ਸਾਂਵੀ ਕੰਧ** (ਸੰਤੋਖ ਸਿੰਘ ਧੀਰ), **ਉਜਾੜ** (ਕੁਲਵੰਤ ਸਿੰਘ ਵਿਰਕ), **ਘੋਟਣਾ** (ਮੋਹਨ ਭੰਡਾਰੀ), **ਦਲਦਲ** (ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ) ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

Section - C

3। ਸ਼ਬਦ-ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ : ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ

4। ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ

Section - D

5। ਪੈਰ੍ਹਾ ਰਚਨਾ
6। ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ
7। ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ

Suggested Readings:

- ਗਿਆਨ ਮਾਲਾ
- ਆਤਮ ਅਨਾਤਮ
- http://swayam.gov.in/
- http://edx.org formerly http://mooc.org/

Bachelor of Computer Applications (Semester – II)

OLBCA - 216P - Programming Laboratory–II

(Advanced C++ Programming)

M. Marks: 100

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

OLBCA-217T : Punjab History Culture-II

(Special paper in lieu of Punjabi Compulsory)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

1. Sikh Struggle for Sovereignty.
2. Ranjit Singh: Conquests, Administration and the Anglo-Sikh Relations.

Section-B

1. Anglo-Sikh Wars and the Annexation.
2. The Punjab under the British: New Administration, Education and social Change.

Section-C

1. Economic Changes: Agricultural
2. Socio-Religious Reform Movements.

Section-D

1. Role of Punjab in the Freedom Struggle.
2. Fairs and Festivals.

Suggested Reading

1. Kirpal Singh (ed.), *History and Culture of the Punjab*, Part-II, Punjabi University, Patiala, 1990.
2. Fauja Singh (ed.), *History of Punjab*, Vol, III, Punjabi University, Patiala, 1987.
3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*
4. Khushwant Singh, *A History of the Sikhs*, Vol. I, OUP, New Delhi, 1990
5. http://swayam.gov.in/
6. http://edx.org formerly http://mooc.org/

OLBCA – 311T: Computer Architecture

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

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.

Section – B

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.

Section – C

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

Section – D

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

References:

1. Computer System Architecture: M.M. Mano (PHI)
2. Computer Architecture: J.P. Hayes.
3. Computer Architecture: Patterson & Hemessy.
4. http://swayam.gov.in
5. http://edx.org formerly http://mooc.org

OLBCA – 312T: Database Management System

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantage and disadvantage, levels of database system.

Section – B

Relational model, hierarchical model, network model, comparison of these models, E–R diagram, different keys used in a relational system, SQL DBA, responsibilities of DBA.

Section – C

Relational form like INF, 2NF, 3NF, BCNF, 4th NF, 5th NF, DBTG, concurrency control and its management, protection, security, recovery of database.

SQL: Introduction to SQL–DDL, DML, DCL

Section – D

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.

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
9. http://swayam.gov.in
10. http://edx.org formerly http://mooc.org
11. http://epgp.inflibnet.ac.in/

OLBCA – 313T: Computational Problem Solving through Python

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

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

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

Section – B

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

Section – C

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

Section – D

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 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 Computating & 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.
8. http://swayam.gov.in
9. http://edx.org formerly http://mooc.org
10. http://epgp.inflibnet.ac.in/

OLBCA – 314T: Programming Laboratory - III

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Practical will be based on Python Language and Oracle (based on DBMS)

OLESL 315T: Environmental Studies

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

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.

Section – B

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)

Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity
- Bio-geographical 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

Section – C

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

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

Section – D

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

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.
11. http://swayam.gov.in
12. http://edx.org formerly http://mooc.org
13. http://epgp.inflibnet.ac.in/

OLBCA – 411T: Data Structures and File Processing

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

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.

Section – B

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.

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

Section – D

File Organization Techniques: Sequential, indexed, indexed sequential, Direct, Hashing.

Concept of master and transaction files.

References:

1. Data Structure – Seymour Lipschutz, Schaum Outline Series.
2. File Structure & Data Structures by E. Loomis.
3. Data Structures by Trabley & Soreuson
4. http://swayam.gov.in
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLBCA – 412T: Information Systems

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

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

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

Section – D

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.
4. http://swayam.gov.in
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLBCA – 413T: Internet Applications

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

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).

Section – B

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.

Section – C

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 – D

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, 3rd Edition.
4. http://swayam.gov.in
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLBCA – 414T: System Software

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

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, concatenation of macro parameters, generations of unique labels, 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. Dhamdhere: Introduction to System Software, Tata McGraw Hill.
3. D.M. Dhamdhere: System Software and Operating System, Tata McGraw Hill, 1992.
4. Madrich, Stuarte: Operating Systems, McGraw Hill, 1974.
5. Stern Nancy Assembler Language Programming for IBM and IBM Compatible Computers, John Wiley, 1991.
6. http://swayam.gov.in
7. http://edx.org formerly http://mooc.org
8. http://epgp.inflibnet.ac.in/

OLBCA – 415P: Programming Laboratory - IV

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Practical will be based on

- Data Structure implementation using C++
- Web Designing and use of Internet

OLBCA - 511T: Computer Networks

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

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.

Section – B

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.

Section - C

Local Area Network Protocols: CSMA Protocols, BRAP, MLMA, IEEE standards 802, Token Bus, Token Ring, FDDI.

Data Link Layer Design Issues: Services provided to Network layer framing, error control, flow control, link management. Error detection & correction, Elementary Datalink Protocols.

Design Issues of Network Layer: Services provided to transport layer, routing, connection, internet & World Wide Web.

Section – D

Network Security and Privacy: Brief Introduction to Cryptography.

Network Services: File transfer, Access & Management, Electronic Mail, Remote login

References:

1. Tannanbum, A.S.: Computer Networks, Prentice Hall, 1992, 3rd Edition.
2. Stallings, William: Local Networks: An Introduction: Macmillan Publishing Co.
3. Stallings, William: Data Computer Communication, Macmillan Publishing Co.
4. http://swayam.gov.in/
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLBCA - 512T: Web Technologies

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Web Essentials, Markup languages, CSS

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

Section – B

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

Section - C

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

Section – D

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.
4. http://swayam.gov.in/
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLBCA - 513T: Operating System

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Introduction: Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, Real–time Systems.

Processes: Process concepts, Process Scheduling, Threads.

Section – B

CPU–Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.

Process Synchronization: Critical – section problem, semaphores, classical problem of synchronization.

Section - C

Memory Management: Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation.

Virtual Memory: Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.

Section – D

Secondary Storage Structures: Disk structures, Disk scheduling, Disk Reliability.

Deadlocks: System Model, Deadlock characterization, methods for handing 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.
4. http://swayam.gov.in/
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLBCA – 514P: Programming Laboratory - V

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Practical will be based on: -

- Computer Networks
- Web Technologies
- Operating System

OLBCA - 515T: Applied & Discrete Mathematics

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

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.

OLBCA - 611T: Computer Graphics

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
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3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Overview of Graphics system: Computer Graphics and their applications.

Display Devices: CRT Monitors (Random – Scan and Raster Scan, DVST, Plasma – Panel Display, LED and LCD Monitors.

Section – B

Graphics Software

Elementary Drawing: Points and various line drawing Algorithms and their comparisons. Circle generating algorithms, Algorithms for ellipse, arc and spiral.

Section - C

Two Dimensional Transformations: Basic Transformations, Scaling, Translation, Rotation, Reflection, Shear, Matrix representation of Basic transformations and homogenous coordinates

Section – D

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.

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.
4. http://swayam.gov.in/
5. http://edx.org formerly http://mooc.org
6. http://epgp.inflibnet.ac.in/

OLBCA - 612T: Software Engineering

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Introduction to Software: Definition, Software characteristics, Software components, Software Applications.

Introduction to Software Engineering: Definition, Software Engineering Paradigms, waterfall method, prototyping, interactive Enhancement, The Spiral model, Fourth Generation Technique.

Section – B

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.

Software Requirement Specification (SRS): Problem analysis, structuring information, Data flow diagram and data dictionary, structured analysis, Characteristics and component of (SRS)

Section - C

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.

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.

Section – D

Detailed Design: Module specification, Specifying functional module, specifying data abstraction, PDL and Logic/Algorithim Design.

Coding: Coding by Top–down and Bottom–up, Structured Programming, Information Hiding, Programming style, Internal Documentation.

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
3. http://swayam.gov.in/
4. http://edx.org formerly http://mooc.org
5. http://epgp.inflibnet.ac.in/

OLBCA – 613P: Project

Time: 03 Hours **Max. Marks: 300 Marks**

Internal Assessment: 90 Marks

End Term: 210 Marks

General Instructions:

- A software module is to be developed.
- The soft copy of the module shall be submitted to the College/Institute till April 30th
- The software module shall be developed in groups, consisting of at most two students in a group.
- The Directorate shall depute 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.

OLBCA – 614P: Programming Laboratory - VI

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Implementation of Applications of Computer Graphics in C++/C